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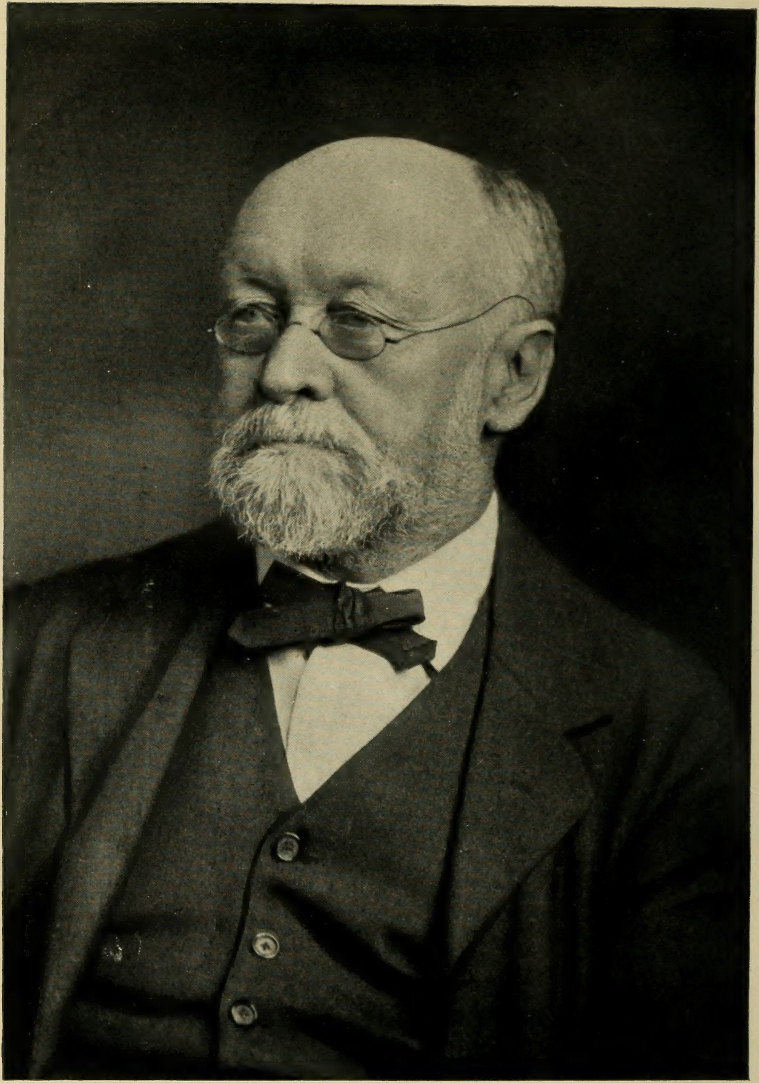

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FOREWORD TO VOLUME FIFTY.

A PORTRAIT in the forefront of a work by a living author is generally an evidence either of celebrity or obscurity. In the former case it is usually placed there at the suggestion of his publisher; in the latter at his own, in which case it may be regarded as a form of self-advertisement. There may, however, be a reason apart from either of these extremes, and I venture to think that the completion of the fiftieth year of a Journal may afford sufficient justification for prefixing thereto the portrait of one who has been responsible for the publication of thirty-two of its volumes, and whose name appeared among the contributors to its first issue in 1863.

JAMES BRITTEN.

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THE

JOURNAL OF BOTANY

BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.S.G., F.L.S.

Late Senior Assistant, Department of Botany, British Museum.

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BRITISH AND FOREIGN

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EDITED BY

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THE
JOURNAL OF BOTANY
BRITISH AND FOREIGN.

SIR JOSEPH DALTON HOOKER.
(1817–1911.)

By G. S. Boulger, F.L.S.

It was certainly not merely the effluxion of time that had given Sir Joseph Hooker the position of the greatest botanist in Britain, if not in the whole world, at the time of his death. True, his ninety-four-and-a-half years had made him the *doyen*, perhaps, of every scientific society to which he belonged and of the botanists of the world; but men of science have before now attained as great an age. Of these years, however, an exceptionally large proportion—roughly speaking, seventy—had been years of scientific output; and that output had been, from first to last, wide in range and of an importance which must assuredly have a lasting effect upon botany. Time and space permit now merely the outline of an appreciation of this life-work.

Sir Joseph's name appears on many plates, especially on those of mosses, hepatics, lichens, and algæ, in his *Flora Antarctica*; and such histological drawing, as in those of *Myzodendron*, is of a high order, though the landscapes in the *Himalayan Journals* are certainly not equal, from an artistic standpoint, to such work as that of Edward Forbes. Few of us, however, ever think of Sir Joseph Hooker, as we do of his father, as a botanical artist.

For ten years Assistant Director and for twenty years Director of Kew, he necessarily devoted time and energy to administration which botanists may well grudge. Here again what he accomplished was, perhaps, not as remarkable an achievement as was Sir William's. In 1840 Sir William, already fifty-five years of age, came to Kew with everything to be created *ab initio*. He brought with him an extensive nucleus for a library and herbarium; but, practically, gardens, arboretum, houses, museum, and staff had yet to be established. The revival of the practice of sending out collectors, as Banks had done, and the establishment of systematic correspondence with foreign and colonial gardens and botanists, laid the foundation of that regular centralized organization which now obtains. Sir Joseph, who became Assistant Director at thirty-eight and Director at forty-eight, inherited the results of his father's work, though there can be no question as to the ability evinced in its further development.

The valuable contributions to fossil botany which marked the earlier part of Sir Joseph's scientific career, the papers on *Lepidostrobus*, *Trigonocarpon*, and plants alike of the Carboniferous and the Eocene periods, are remembered by few, sound as they were in observation and reasoning. Except in diagnostic or purely systematic work, he is not thought of as an anatomist or as a physiologist; but the paper on the rostellum of *Listera ovata*, those on *Nepenthes*, the *Balanophoreæ*, and on *Welwitschia* were, by themselves, no mean achievement.

In a vast series of official or semi-official volumes he described an enormous number of new genera and species in many different classes of plants, and he had a large share in what was probably, with the exception of De Candolle's *Prodromus*, the most important critical work in descriptive botany during the nineteenth century. The familiar abbreviations, *Hook. fil.* and *Benth. & Hook. fil.*, will remain affixed to a host of plant-names as long as botanists retain this useful method of verifying their nomenclature. Such work, though invaluable to botanists, is not, perhaps, the highest department of the science; and other botanists of the past or present may have been capable of performing it as well, or possibly better than he did. His diagnoses, if clear, are not remarkably concise. It may, however, be readily maintained that even this, great as it is in bulk, was not his most important contribution to botanical science.

He was not called upon to teach or to write much educational matter, his *Primer* is not remarkable among books of its class, nor was the mere popularizing of his science his *métier*. The *Himalayan Journals* is in fact his only work appealing to the general reader. The novelty and interest of their subject-matter and the simplicity of the narrative gave them considerable temporary success, but not the lasting appeal of Darwin's *Voyage in the Beagle*, their professed model. So, too, his various admirable addresses, mostly delivered at the meetings of the British Association, such as those on Insular Floras, the Arctic Floras, and Insectivorous Plants, though hailed with acclamation by his brother botanists, attracted but scanty outside attention. Retaining throughout life a Scottish intonation acquired in his youth, and without the graces of the orator, although an excellent chairman—as he was, for example, for many years to the Scientific Committee of the Royal Horticultural Society—he could better reach a truly appreciative audience with his pen.

It is, we think, as a geographical botanist that Sir Joseph Hooker was supreme. In this department of botany he evinces the greatest originality, while at the same time eminently susceptible to the influence of the opinions of others, opinions which, when once accepted, he championed with enthusiasm and supported by the most forceful reasoning, and by the wealth of illustrative fact which only he, perhaps, could wield. Lyell, Forbes, Darwin, were in this—perhaps in the order in which they are here named—the main influences to which he submitted. He was for many years in constant correspondence with Sir Charles Lyell, their fathers having been intimate friends before them, and he himself testifies that, without Sir Charles's work, "the science of geographical distribution would have been to me little beyond a tabulation of important facts."* How much the science, even from its botanical side, is indebted to Lyell's *Principles*, long ante-dating as they do both Hooker's Essays and Darwin's *Origin of Species*, has not, perhaps been sufficiently recognized.

To us, to whom the enthusiastic versatility and winsome personality of Edward Forbes is only a tradition, it is difficult to realize the instantaneous acceptance which the views, put forward in his paper on Endemic Plants read to the Cambridge meeting of the British Association in 1845 and elaborated in his celebrated Geological Survey Memoir a year later, met with at the hands of his fellows. Hooker writes† of the latter as "the most original and able essay that has ever appeared on this subject, and, though I cannot subscribe to all its botanical details, I consider that the mode of reasoning adopted is sound and of universal application." He reiterates this opinion in the *Flora Indica*, acts upon it alike in his treatment of the Fuegian flora and of that of India, and, nearly thirty years later, writes,‡ "After many years' interval I have re-read this Memoir with increased pleasure and profit."

The mutual influence of Hooker and Darwin is more difficult to disentangle. An interesting account of their friendship, which began in 1839, appears in Dr. Francis Darwin's *Life and Letters* of his father,§ from Hooker's pen; and in the *Introductory Essay to the Flora of New Zealand* Hooker writes: || "The fact of this accomplished Naturalist and Geologist having preceded me in the investigation of the Natural History of the Southern Ocean has materially influenced and greatly furthered my progress . . . Mr. Darwin not only directed my earliest studies in the subjects of the distribution and variation of species, but has discussed with me all the arguments and drawn my attention to many of the facts which I have endeavoured to illustrate in this Essay."

Per contra, after Hooker's return from the Antarctic he was a frequent visitor at Down, where, as he says: ¶ It was an established rule that he [Darwin] every day pumped me, as he called it, for half-an-hour or so after breakfast in his study, when he first brought out a heap of slips with questions botanical, geographical, &c., for me to answer"; whilst Darwin himself, in sending Hooker the manuscript of the chapter on Distribution for the *Origin of Species*, writes: ** "I never did pick anyone's pocket, but whilst writing my present chapter I keep on feeling (even when differing most from you) just as if I were stealing from you, so much do I owe to your writings and conversation, so much more than mere acknowledgements show."

---

* *Introductory Essay to Flora of New Zealand* (1853), p. 22. † *Ibid.*

‡ *Address to the Geographical Section, Brit. Assoc.*, 1881.

§ *Life and Letters of Charles Darwin*, vol. ii. pp. 19 *et seq.* || *Ibid.* p. 22.

¶ *Life and Letters*, ii. p. 27. ** *Ibid.* ii. p. 148.

The *Introductory Essays to the Floras of New Zealand and Tasmania*, if indebted for a fundamental notion to Forbes's work, are immeasurably superior to that pioneering *tour de force*, in so far as they contain a vast body of sound reasoning, both on distribution and on the origin of species, securely based on a wide accumulation of facts that, unlike Forbes's, were largely the first-hand accumulations of the author. At the same time, it is to do a disservice to Hooker's reputation to speak, as some have done, of these two essays as anticipating the *Origin of Species*. Although Darwin had communicated the central theory of that work, that of Natural Selection, to his friend before its publication, Hooker had not then accepted that theory. If he "had taken, consciously or unconsciously, the first step away from the dogma of the constancy of species" * in the *Flora Antarctica*, and treated, as he certainly does, the mutability of species as an open question in the *Introductory Essay to the Flora of New Zealand*, in the *Flora Indica* (1855), the joint work of Dr. Thomas Thomson and himself, agreement is expressed with Lyell's opinion "of species being definite creations" as "opposed to the theory of universal mutability." Hooker was certainly then far removed from the outspoken Darwinism of his presidential address to the British Association at Norwich in 1868, or of his *Primer* of 1876, in which he styles the theory of independent creation "purely speculative, incapable from its very nature of proof; teaching nothing and suggesting nothing, . . . the despair of investigators and inquiring minds."

Whilst to Forbes the geographical distribution of plants was mainly interesting as throwing light on past geographical changes, to Hooker and Darwin it is conversely most interesting as elucidating the phylogeny of species.

On one occasion Darwin wrote to Hooker †: "I know that I shall live to see you the first authority in Europe on that grand subject, that almost keystone of the laws of creation, Geographical Distribution." If it can hardly be maintained that this prophecy was fulfilled, ‡ this was probably because Hooker was so engrossed in administrative work that his solid results remained in the comparative obscurity of four or five separate essays, mostly in costly systematic treatises, instead of being in the form of such a book as De Candolle's *Géographie Botanique*. We are at a loss to know why, considering how often fugitive publications of far less value are collected, these admirable essays have never been republished in volume form. Darwin several times urged that they should be so collected.

---

* *Gardeners' Chronicle*, vol. ii. (1911), p. 436.

† *Life and Letters*, i. p. 336.

‡ Some would, perhaps, say that Darwin's prophecy was fulfilled. Sir W. T. Thiselton-Dyer, for instance, writes (*Darwin and Modern Science*, p. 307): "If Darwin laid the foundation, the present fabric of Botanical Geography must be credited to Hooker. It was a happy partnership. The far-seeing, generalising power of the one was supplied with data and checked in conclusions by the vast detailed knowledge of the other . . . Bentham tells us: 'after De Candolle, independently of the great works of Darwin . . . the first important addition to the science of geographical botany was that made by Hooker in his *Introductory Essay to the Flora of Tasmania*' . . . It cannot be doubted that this and the great memoir on the *Distribution of Arctic Plants* were only less epoch-making than the *Origin* itself." In writing as we have done above, we meant only to suggest that, at least in general public opinion, the authors of comprehensive treatises, the Drudes and Schimpers, &c., to say nothing of pre-Darwinian De Candolle and belated Grisebach, will rank before the writer of the most original and most suggestive of essays on detached portions of the science.

Without attempting anything like a complete bibliography of his writings, such as has already been commenced by Mr. Hemsley in the *Gardeners' Chronicle*,* we must now summarize the facts of Hooker's life.

In the *Annals of Botany* for December, 1902, Hooker published an excellent *Sketch of the Life and Labours* of his father, in which he records that the Hooker family, to which the "judicious" Church historian belonged, was for many generations in Devonshire; and that his grandfather, another Joseph Hooker, was the first to come to East Anglia, settling in business at Norwich, where Sir William was born. The grandfather, a self-educated man, was a fair German scholar and had a collection of succulent plants, whilst his wife came of an artistic stock. It is noteworthy also that Sir William and his brother, a second Joseph, were both keen entomologists, and that the former was devoted also to ornithology, though he also collected the lichens, freshwater algæ and bryophytes of Norfolk before the discovery of *Buxbaumia aphylla*, then new to Britain, led to his introduction to Dawson Turner, an event that determined the whole course of his life. William Hooker became exclusively a botanist and mainly a cryptogamist. He drew 231 plates for Turner's *Historia Fucorum*; was introduced to Banks and Brown; joined the Linnean Society; had the genus *Hookeria* dedicated to him by Sir James Edward Smith in 1808; and made a short but adventurous journey to Iceland in 1809, of which the *Journal* was privately printed in 1811 and published in 1813. Hoping to go out to Ceylon, he copied more than two thousand of the native drawings of Indian plants, made for Roxburgh, which were then at the India House, these copies forming ten duodecimo volumes, now at Kew. He also thought of visiting Java; but political and climatic considerations prevented him from having those opportunities for distant travel which his son was destined to enjoy. The Yarmouth bank having a lien on a brewery at Halesworth, in Suffolk, Dawson Turner entered into a partnership with Mr. Paget, the father of the late Sir James Paget, and William Hooker, to carry it on—the latter acting as manager, undoubtedly as a square man in a round hole. In 1814 and 1815 Hooker was in France with the Turners, meeting Antoine Laurent de Jussieu, Lamarck, Mirbel, A. P. De Candolle and Humboldt, and in the June of the latter year he married Maria, one of Dawson Turner's accomplished daughters.

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* Vol. ii. (1911), pp. 428–9.

There were four children of this marriage, William Dawson Hooker, the ill-fated elder son, being born in 1816, almost certainly at Halesworth, and not, as I have stated in the *Dictionary of National Biography*, at Glasgow, and Joseph Dalton on June 30th, 1817. The name Joseph perpetuated that of his uncle—who had died in 1815 and whose collection of insects was purchased for the British Museum—and of his grandfather, who survived for many years, dying ultimately at Kew. The name Dalton was that of his godfather, the Rev. James Dalton, Rector of Croft, in Yorkshire, a botanist to whom the genus *Daltonia* Hook. & Taylor is dedicated.

When Joseph Hooker was three years old, his father, with a little family dependent on him and having to face a considerable loss of money, from bad investments apparently, the brewery and the cost of his *British Jungermanniæ*, accepted the Regius Professorship of Botany at Glasgow, in which post, during the following twenty years (1820–1840) he distinguished himself as a teacher, organized an excellent garden, established a world-wide correspondence, and formed a considerable private library and a very extensive herbarium.

Educated at the High School and at the University of Glasgow, much of Joseph Hooker's youth was spent in his father's herbarium. We see the result of this early training in the care taken by the younger botanist in the collection of Cryptogamia, in his excellent drawings, chiefly of these plants, and in the interest in geographical botany which his father had evinced in an admirable summary in Laurie's edition of Malte-Brun's *Geography*.

In the sketch of his father's life, from which we have already quoted, we have Sir Joseph Hooker's testimony to his father's "solicitude, with which he fostered my own aspirations to become a traveller and a botanist; the interest he took in my ambitious projects; the energy with which he aided me in overcoming every obstacle . . . and prevailed on the higher powers to grant me facilities and funds; and last but not least, the liberality with which he helped me whenever other resources were exhausted. In this connexion I refer especially to four crises in my scientific career: my appointment to accompany Sir James Ross in the Antarctic Expedition in 1839 (for which he supplied all my scientific outfit); my (unsuccessful) candidature for the Professorship of Botany in Edinburgh University in 1845; my mission to India in 1847; and my appointment as Assistant Director of Kew in 1855."

At the beginning of 1839 the British Government decided to dispatch an expedition under Captain Sir James Clark Ross for magnetic and geographical research in Antarctic latitudes. Hooker took his degree as M.D. at Glasgow in time to enter the navy as assistant surgeon and botanist to the expedition, and the two exploring ships 'Erebus' and 'Terror' sailed from Chatham on September 29th, 1839. Hooker was attached to the 'Erebus,' Dr. David Lyall to the 'Terror.' Whilst in the library of the Herbarium at Kew there are various volumes of manuscript containing his journals, plant-lists, notes, drawings, and letters to his father, there is one small note-book in the Botanical Department of the British Museum in which Hooker has entered lists of the plants observed in the various islands touched at in the earlier part of the voyage, with a few analytical notes and drawings, the latter evincing the botanical precision and finished draughtsmanship that characterize all his work with pencil and brush. Reaching Madeira in the middle of October, they spent eleven days there, and visited Teneriffe, the Cape Verd Islands, and St. Paul's Rocks in the following month, then crossing to the almost inaccessible island of South Trinidad *en route* for St. Helena, which was visited in February, 1840. After two days in Simon's Bay in April, colder latitudes were reached, with their profusion of *Macrocystis pyrifera*, and, after an ineffectual attempt to land on the Crozet Islands, two-and-a-half winter months were passed at Kerguelen's Island. Tasmania was reached in August, 1840, and left in November, the spring months being spent at Lord Auckland's Islands and Campbell's Island. After the voyage southward to the ice-barrier in lat. 78° S., and the discovery of Mounts Erebus and Terror, respectively an active and an extinct volcano, the expedition returned to Hobart Town in April, 1841, visited Sydney in July, and anchored for three months (August–November) in the Bay of Islands. Here Hooker, with the assistance of Rev. William Colenso and others, collected materials for his *New Zealand Flora*. A second cruise, along the ice-border, begun in November, 1841, brought the explorers to the Falkland Islands in April, 1842, where they remained till September, so that Hooker was able practically to complete the work of Gaudichaud and D'Urville. In September a visit to Hermit Island, near Cape Horn, led to Sir James Ross's futile attempt to introduce *Fagus antarctica* and *F. betuloides* into the Falklands. The third cruise southward included a visit to Cockburn's Island in lat. 64°, the flora of which comprised only three sea-weeds, and seventeen other cryptogams. After passing from the zone of *Scytothalia Jacquinotii* south of 63° S., and that of *Macrocystis* and *Durvillea* between 55° and 51°, the expedition regained the Cape of Good Hope just three years after leaving it.

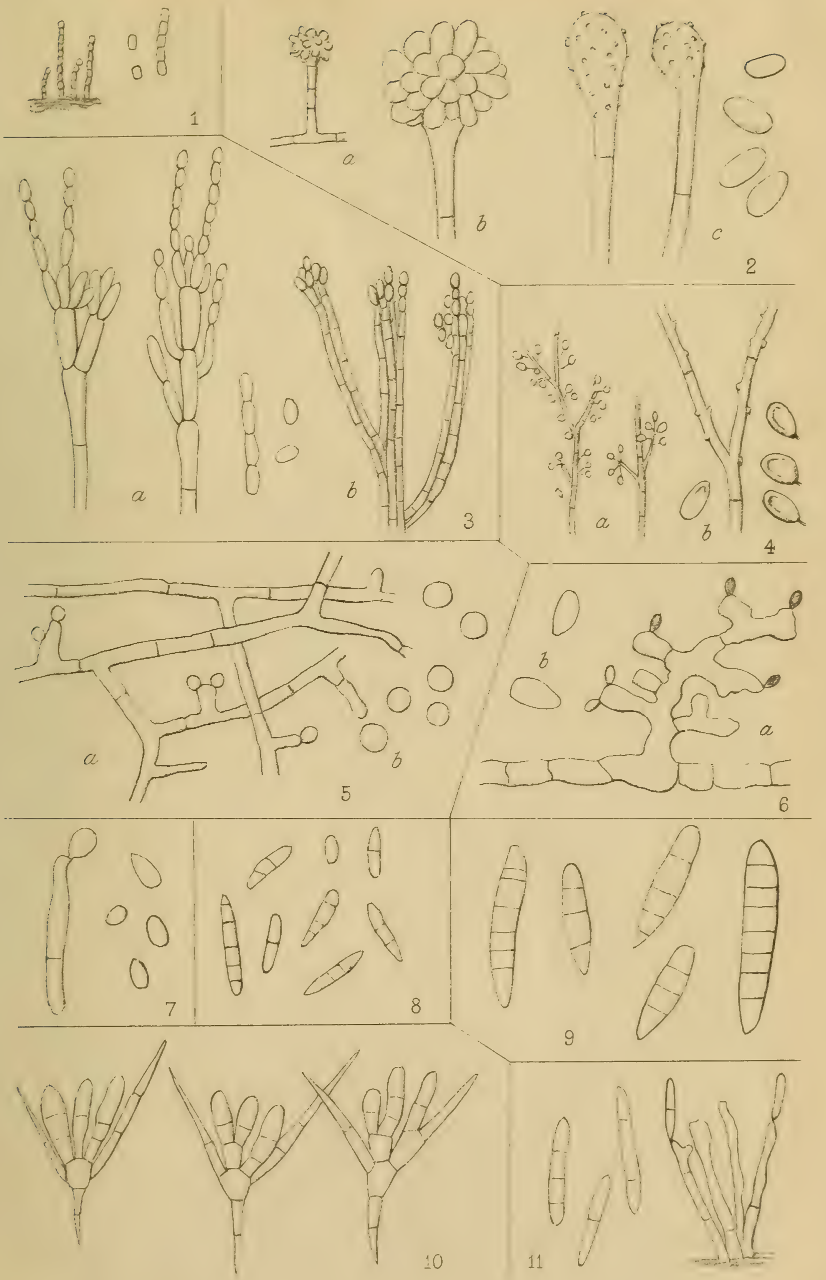
Meanwhile Hooker's earliest papers were published during his absence, the first of them belonging to directions of work, which, after a few years, he abandoned. The first, a joint paper with William Henry Harvey, was on Indian Mosses, in his father's *Journal of Botany*, while the earliest of which he appears as sole author is a short note on Fossil Wood from Macquarie Plains, Tasmania, in the Tasmanian *Journal of Natural Science*.

His inherited interest in the lower Cryptogamia was further evinced in the preliminary publications of his Antarctic results —the *Musci Antarctici*, jointly with William Wilson; the *Lichenes Antarcticæ*, with Thomas Taylor, published in 1844; and the *Algæ Antarcticæ* and the *Algæ Novæ Zealandiæ* with Harvey, published in the following year. Not only was Hooker the part author of these papers; but his name appears also with that of Walter Hood Fitch, for so many years associated with Sir William Hooker's work, on the plates of these groups in the *Flora Antarctica*. As the Treasury grant towards the publication of that work was only £1000 for five hundred plates, Hooker gave the drawings and the text to the publisher, Lovell Reeve. Seldom have the results of a botanical expedition been as completely or as promptly published. The whole work, entitled *The Botany of the Antarctic Voyage of H.M.S. 'Erebus' and 'Terror,'* was dedicated to the Queen; ran to six volumes, comprising in all over 2000 pages and 523 plates; and was not completed until 1860. It consists, however, of three works, each in two volumes, and the first two of these, the *Flora Antarctica*, were published in 1844 and 1845. In these, the islands of the Antarctic visited by the expedition are treated in two groups, Lord Auckland's and Campbell's Islands, belonging in the main to New Zealand, whilst all the points visited from the Falklands to Kerguelen's Island are treated as an extension of the Fuegian flora. Their entire vegetation is described, and considerable space is devoted to the distribution of the gigantic kelps.

As Hooker was starting on his Antarctic voyage in 1839, he had received from Mr. Lyell (Sir Charles's father) an early copy of Darwin's *Journal* of the 'Beagle' voyage; but it was at this period that, over Hooker's examination of Darwin's Galapagos plants, the acquaintance between the two men ripened into intimacy, Hooker paying frequent short visits to Down, and Darwin first discussing with him his then developing opinions as to the mutability of species. Then too occurred what was, perhaps, the sole failure in Hooker's career, when, in spite of the admirable work he had done, with its abundant promise of what was to come, and in spite of testimonials from Humboldt, Robert Brown, and other leaders of science, Professor John Hutton Balfour—who was some nine years his senior—was, in 1845, preferred to him in the election of a Professor of Botany for Edinburgh.

In 1846, however, Hooker was appointed botanist to the Geological Survey, an appointment which, though it lasted but a very brief period, led to a valuable series of papers in the second volume of the *Memoirs of the Survey* (1848), and others later. These include "The Vegetation of the Carboniferous Period," *Stigmaria*, and *Lepidostrobus* in the former; papers on fossil plants from Reading, *Carpolithes* and *Folliculites*, all of Eocene age, in the Geological Society's Journal for 1854 and 1855, and the joint paper with Edward William Binney on *Trigonocarpon* in the *Philosophical Transactions* for 1855.

In 1847 Hooker started on the second great journey of his life. Ever since his return from the Antarctic, with an appetite whetted by glimpses of Madeira and St. Helena, he had wished to examine in person the difference between polar and temperate floras on the one hand, and those of the tropics on the other. He had been assisting in his father's *Niger Flora* by drawing up a *Flora Nigritiana* from the collections of Vogel, Don, and others, and had completed about a third of the work (pp. 203–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W B Grove del.
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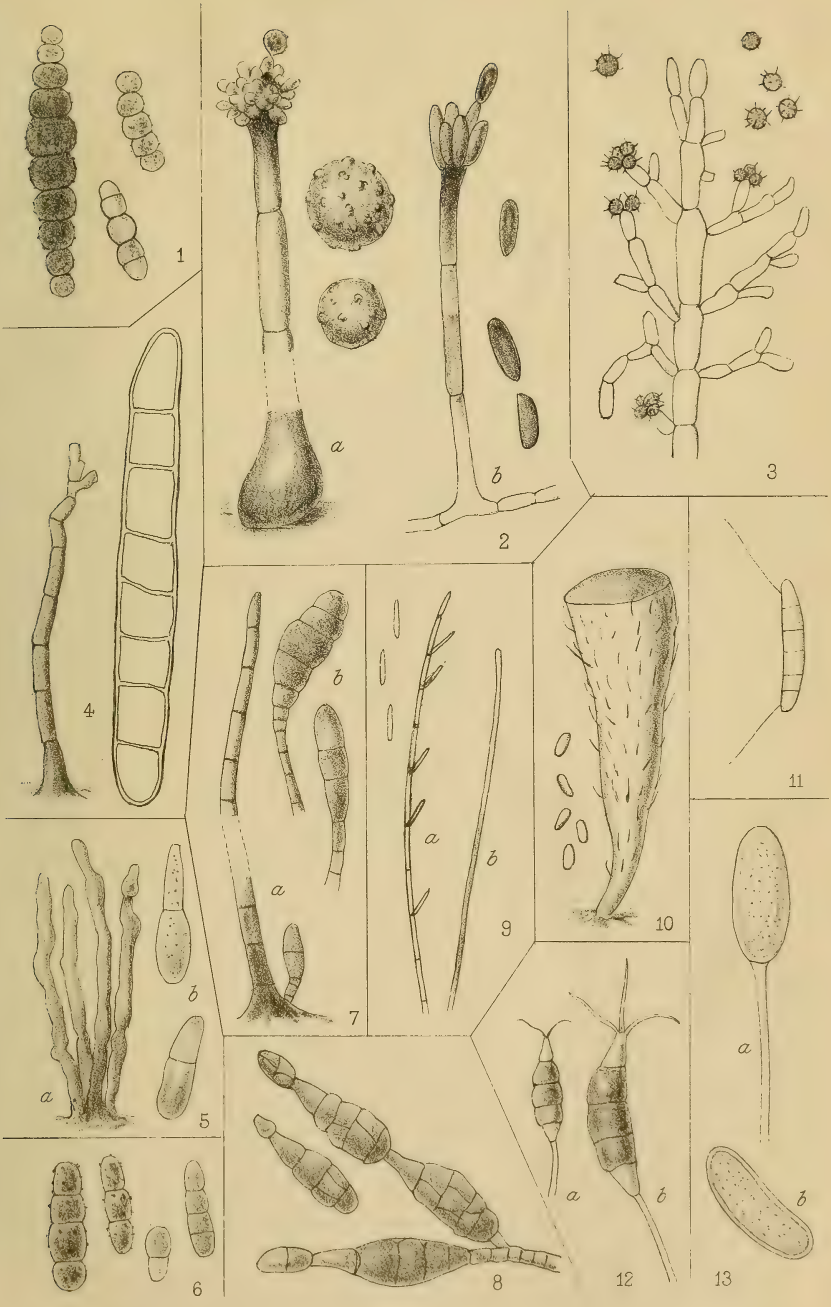
West, Newman imp.

New or Noteworthy Fungi.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W. B. Grove del.
P. Highley lith.
West, Newman imp.

New or Noteworthy Fungi.

332), down to and including the *Leguminosæ*, before he set out. The remaining two-thirds were completed by Bentham, and the work was published while Hooker was in the Himalayan region. Humboldt represented to Lord Carlisle, then head of the Office of Woods and Forests, that Himalayan collections would be of great value to Kew: Lord Auckland, First Lord of the Admiralty, was anxious that the economic resources of Labuan should be investigated; and thus a first grant of £400 a year for two years was secured for Hooker, making his journey a Government mission. He was provided with a passage out in the 'Sidon'; but at Suez was invited to join the staff of Lord Dalhousie, the Governor-General, and so completed the voyage on his official vessel the 'Mozuffer,' reaching Calcutta in January, 1848. The intention of extending the expedition to Borneo was abandoned; but Hooker's earlier letters to his father were printed by Sir William in the *Journal of Botany* as "Notes of a tour in the plains of India, the Himala and Borneo," and reprinted in two parts, "England to Calcutta" and "Calcutta to Darjeeling" (1848-9), the title-page serving to mislead the writers of some obituary notices into speaking of Sir Joseph's having visited Borneo, which he never did.

(To be continued.)

NEW OR NOTEWORTHY FUNGI.—Part IV.

By W. B. Grove, M.A.

(Plates 515, 516.)

These notices of fungi, chiefly from the neighbourhood of Birmingham, are a continuation of the series of which Part iii. appeared in this Journal in May and July, 1886; the long interruption has been due to the fact that other and more pressing occupations prevented the gathering together of the various notes made during the interval. Owing to this, some of the species here mentioned have been already recorded as British elsewhere. The numbers prefixed are a continuation or a repetition of those of the previous parts.

134. **Tricholoma humile** var. **evectum** *m.*

Pileo 7·5–9 cm. diam., plano, dein depresso concavoque, glabro, levi, hygrophano, fusco, demum pallescente; margine integro, non striato; carne pallida. Stipite 7·5–8 cm. × ·8 cm., apice leviter incrassato, basi crassiore, fibroso, farcto, fuscidulo, punctato-squamuloso, striatulo, superne pulverulento, albido. Lamellis confertis, sinuatis, pallide ochraceis, tenuibus; margine integro; sporis candidissimis, ovalibus, 6–7 × 4·5 μ.

In foliis emortuis coacervatis, Studley Castle (Wk.), Sept.–Oct.

I was for a long time in doubt to what species this should be assigned, but am at length convinced that it is closely allied to some of the forms of the very variable *T. humile*; it differs, however, in the colour of the gills and in other points, but above all in its stature, which is strikingly greater than that of any other state of the species that I have seen. The surface of the pileus, when dry, looks like dark chamois leather; the texture of the stem is different from that of the pileus, but the mycologists to whom I have submitted specimens agree that it is a form of *T. humile.* It has maintained these characters without variation for five or six years, appearing continually on the same spot. Two or three specimens occasionally grew together, but for the most part they occurred singly, unlike the typical form.

This variety bears a resemblance at first sight to *Collybia radicata.* It is probable that several species, worthy of being distinguished, are included under the idea of *T. humile*, and that this is one of them.

135. AGARICUS CAMPESTRIS var. FULVASTER Vittadini.

Pileus convex, 2–2½ inches broad, ½ inch or more thick, golden yellow, somewhat scaly; flesh very solid, nearly pure white, turning brown when cut or broken. Stipe solid, 2½ × 1 inch, whitish above, yellow below, stained everywhere more or less with brown; ring superior, deflexed. Gills numerous, free; spores oval, purple, $8 \times 6\ \mu$.

Several specimens of this beautiful variety in a cellar at Sparkhill (Ws.), April; also found by Mr. C. W. Lowe at the Botanic Gardens, Edgbaston (Wk.). The brown colour of the broken flesh tends rather towards a dull red.

136. INOCYBE PROXIMELLA Karst. Massee, Annals Bot. xviii. 466; Trans. Brit. Myc. Soc. iii. 44, pl. 2.

In June, 1910, Professor A. H. R. Buller found, in a field at King's Heath (Ws.), a number of specimens of an *Inocybe* with nodulose spores resembling those of *I. asterospora.* But the fungi were much smaller and paler than that species, which is not uncommon in the woods round Birmingham; they were also quite devoid of that thickening of the base of the stem (with a distinct pale margin) which is so characteristic of *I. asterospora.* I am inclined to consider them as belonging to *I. proximella*, with the description of which they agreed almost exactly, especially in the *oblong* (not subglobose) nodulose spores.

137. STEREUM PURPUREUM var. ELEGANS (Purton) = var. *atromarginatum* W. G. Sm., Brit. Basidiom. p. 405.

In Purton's *Midland Flora*, vol. ii. (1817), p. 682, there is a description of a species of *Stereum*, accompanied by a figure (pl. vi.). It is called "*Auricularia elegans*," and is now identified as representing a remarkably neat form of *Stereum purpureum.* I have had the pleasure of meeting with a specimen almost identical with Purton's figure, at Studley Castle. It had a whitish pileus, bordered just within the margin with a dark, almost black, line, or in some cases two. The hymenium was of a purplish brown.

138. PUCCINIA FERGUSSONI B. & Br. Plowr. Uredineæ, p. 207.

Last summer there occurred on *Viola palustris* in the marsh of Chelmsley Wood (Wk.) a large quantity of *Puccinia Fergussoni*. The sori (of teleutospores only) were clustered in large patches 1½–2 cm. in diameter, the rest of the leaf being unoccupied. Curiously enough, the edges of the same marsh were fringed with *Viola sylvatica*, on which was *Puccinia violæ*, with its minute sori of uredo- and teleutospores scattered with great uniformity over the whole lamina; the contrast between the two species was thus shown very clearly.

139. OOSPORA HYALINULA Sacc. Syll. Fung. iv. 17; Fung. Ital. t. 878.

Very thinly effused; conidiophores erect, simple, short, passing almost at once into chains of conidia 30–70 μ long. Conidia oblong or shortly cylindrical, obtuse at both ends, 4–4½ × 2–2½ μ, hyaline. (Tab. 515, fig. 1.)

On dead ash branches, Studley Castle, March. This species is very similar to *O. cuboidea* Sacc. et Ell. It should be compared also with *Geotrichum candidum*, forma *phytogena* Sacc. (*l. c.* p. 39), but seems to be much more delicate and fugitive than either of these.

140. OOSPORA OCHRACEA (Corda) Sacc. Syll. Fung. iv. 23.

Tufts roundish, gregarious, rosy-ochraceous; mycelium very white, thin, floccose, radiating; erect hyphæ short, simple, continuous, bearing erect chains of spores, slightly longer than the hyphæ. Conidia spherical or very slightly cuboid, 3·5–4 μ diam., rosy-ochraceous, equal.

On remnants of extract of malt in a bottle, Lower Edmonton, *Mr. James Scott*, September. In a good light the rosy tinge was quite evident, but the first appearance of the mass was more of a (true) isabelline colour. Corda's specimens were on the thickened juice of elder.

141. OOSPORA SULPHURELLA S. et R. Syll. Fung. iv. 21; Trans. Brit. Myc. Soc. ii. 167.

At first in small tufts, then effused and velvety, pale sulphur-yellow. Sterile hyphæ creeping, whitish; fertile erect, very short, yellow; conidia ellipsoid, 3–4 × 2 μ, yellow, in short chains.

On dead oak-wood, Boston, Lancs., *Sir Henry Hawley*.

142. MONILIA LUPULI Mass. *in litt.* Grove, Journ. Econ. Biol. vi. pt. 2, p. 42, figs. 1–8 (1911).

Forming an effused farinaceous stratum of a fine pinkish-salmon colour. Fertile hyphæ ½–1 mm. high, erect, slender, branched above, branches rather divaricate, chains of spores also branched in the same manner. Diameter of hyphæ 5 μ. Conidia roundish or elliptical, nearly hyaline (singly), 7–9 × 4 μ.

In breweries, on the surface of spent Hops. It looks like a salmon-coloured dust.

104. GEOTRICHUM ROSEUM Grove in Journ. Bot. (1886), p. 198, t. 266, f. 8; Sacc. Syll. Fung. iv. 40.

Several large patches of this species occurred on burnt heathy ground at Romsley, Clent (Ws.), closely resembling the specimens found in Sutton Park nine years before, but differing in several respects: (1) they were on bare ground, not on *Juncus*; (2) they formed large patches, 6–8 inches broad, looking to the naked eye exactly like *Trichothecium roseum*; (3) the conidia were more granular, not hyaline, and thus presented a more decided rosy tinge when viewed singly under the microscope.

The conidia were in long chains, gradually growing shorter towards the end of each chain, but retaining the same breadth; they measured 12–30 × 9–10 μ, the terminal ones being almost cuboid. The cells of the hyphæ were similar but more closely connected, so that they did not fall away, as the conidia easily did, on the addition of water.

143. ŒDOCEPHALUM GLOMERULOSUM (Bull.) Sacc. Syll. Fung. iv. 47; Trans. Brit. Myc. Soc. i. 151.—*Œ. roseum* Cooke, Grevillea, i. 184, t. 22, f. 8; Mass. Fung. Fl. iii. 289.

Mycelium widely creeping, intricate, with numerous septa; conidiophores erect, 250–300 μ high, 10 μ thick, tapering very slightly upwards, remotely septate, terminating in a subglobose or oblong vesicle which is covered with numerous papillæ; hyphæ often densely granular, pink; vesicle nearly colourless or faintly yellow. Conidia of all sizes, at first roundish or ovate, then oblong-obovate, finally 26–30 × 12 μ, smooth, granular, distinctly pink, forming a rather crowded spherical head, 70–80 μ diam. (Tab. 515, fig. 2.)

Forming widely effused, woolly-looking, clear rosy tracts, of the colour of *Trichothecium roseum*, on mosses growing under a bell-glass, and spreading thence to the wet blotting-paper on which they were placed, Edgbaston, November. *Œ. roseum* Cooke is only the early state of this species, as was manifest on watching the various stages of growth under the bell-glass.

144. PENICILLIUM OVOIDEUM Fr. Fung. Hoy. no. 272; Sacc. Syll. Fung. iv. 81.

Forming a thin white crust; fertile hyphæ fasciculate, 0·2 mm. high; fascicles branched, composed of many delicate hyphæ, 3–4 μ diam., ending in a cluster of more or less penicillate ramuli, each bearing a chain of 20–30 conidia. Conidia hyaline, smooth, ovoid or ovoid-oblong, averaging 8 × 4 μ. (Tab. 515, fig. 3.)

On size, Lower Edmonton, *Mr. James Scott*, March. Preuss found his specimens on damp fish-glue.

145. SPOROTRICHUM CHRYSOSPERMUM Harz. Hyphom. p. 19, t. 5, f. 3; Sacc. Syll. Fung. iv. 104.

Effused; mycelium white, vaguely branched, tortuous and intricate, becoming yellow, septate and denticulate towards the ends, 4 μ diam. Conidia broadly oval, rounded above, subacute below, perfectly smooth, bright golden-yellow, 7–10 × 5–6 μ. (Tab. 515, fig. 4.)

On a dead stick, Sutton Park (Wk.), August. The conidia are either borne on the denticules or sessile; in the former case the denticule often falls off with them. Differs from *S. læticolor* C. et M. (Grev. xx. 38) in the form of the conidia, but evidently closely allied.

146. **Sporotrichum terricolum** *m.* Hyphis repentibus, candidis, intricatis, vage ramosis, tenerrimis, septatis, 6–7 μ cr.; conidiis sphæricis, levibus, subhyalinis, pallide ochraceis, numerosissimis, 6–6½ μ diam. (Tab. 515, fig. 5.)

Ad terram argillaceam, Randan Woods (Ws.), Sept. Forming large clusters of spores, ¼ inch thick, surrounded by the white mycelium; the mass of spores had the colour called by house-painters "stone-colour."

147. BOTRYTIS ISABELLINA Preuss, Sacc. Syll. Fung. iv. 121.

Tufts widely effused, of a pleasant isabelline colour; hyphæ thick, repeatedly branched, faintly verrucose at apex. Conidia heaped together, globose, verruculose, 5–6 μ, very numerous, of the same colour.

On bark of Pine, Boston, Lincs., *Sir Henry Hawley*, March. The colour is a pallid pinkish buff, something like that called "crushed strawberry," but faded and dirty. *B. carnea* Schum. (Syll. p. 119) seems to be very similar, except that in that species the conidia are described as "solitariis v. bi-ternatis"; but surely such a difference would be merely dependent upon age?

148. **Botrytis violacea** *m.* Mycelio effuso, hypochnoideo, amœne violaceo, stratum tenue sistente; hyphis hinc illinc tumidulis, 6–8 μ diam., laxe ramosis intertextisque; fertilibus erectis, ramosissimis, apice tumidis clavatisque; conidiis numerosis, sparsis, ovato-ellipticis, saturate violaceis, 6–7 × 3½ μ, basi subapiculatis, lateralibus v. terminalibus. (Tab. 515, fig. 6.)

Plagas magnas, plures unc. longas, ambitu concolore, efformans, in ligno putrido humoque, Studley Castle, Nov. It had much the appearance of a *Corticium*, but the spores were not borne on basidia, and therefore it cannot be *Hypochnus violeus* Quél., apart from the colour of the spores. When fresh it had the exact colour of the flowers of *Viola odorata*, passing when old into a pallid purplish brown. In many ways it agreed with *B. Wallrothii* Sacc., in fact the description of that might be applied word for word, merely changing the colours. It also resembles *B. coccotricha* Sacc. Fung. Ital. t. 694 (see also Journ. Bot. 1884, p. 197, t. 246, f. 5), but differs widely in the size of the conidia.

149. OVULARIA PRIMULANA Karst. Sacc. Syll. Fung. iv. 143.

Spots large, roundish, yellow above, whitish below; hyphæ in hypophyllous tufts, short, simple, continuous, slightly denticulate, hyaline, 60–90 × 7–8 μ; conidia broadly elliptical or oblong, continuous, hyaline, 13–18 × 6–7 μ. (Tab. 515, fig. 7.)

On leaves of Primrose and Cowslip, Studley and Spernal, July, August.

I cannot but suspect that *O. interstitialis* (B. & Br.) is merely a peculiar, perhaps young, state of this where the spots are confined to the interstices of the veins. The conidia are, it will be seen, of the same size and shape; and I have occasionally seen one attached obliquely at the apex of a hypha. Moreover, even if it seem heterodox, I must confess that I think *Ramularia primulæ* Thüm. is nothing but the most advanced stage of the same fungus, though Saccardo remarks that one is "longe diversa" from the other. It is possible by choosing one's specimens to distinguish the latter as:—

Spots smaller, darker, tending towards brownish on both surfaces; hyphæ amphigenous; conidia cylindrical, 1–4 septate, 4–6 μ broad, as much as 50 μ long.

I have found a *Ramularia* answering to this description on Primrose leaves at Olton, Four Oaks, Bewdley, &c., but all stages are to be met with between the two extremes. See No. 154.

150. ACROSTALAGMUS CINNABARINUS Corda, Sacc. Syll. Fung. iv. 163; Mass. Fung. Fl. iii. 331.

On decaying stems of *Helianthus tuberosus* I found, in September, large patches of this fungus perfectly formed, and in other parts small tufts of *Verticillium lateritium* Berk. (Fung. Fl. p. 330). Moreover, one could find every possible stage between the two; and I have watched the gradual growth of a tuft of the *Verticillium* and seen it pass into a perfect *Acrostalagmus*. This experience has, in fact, been repeated several times on different occasions, and there can be no possible doubt that Berkeley's *V. lateritium* is only a young stage of the *Acrostalagmus*.

151. TRICHOTHECIUM OBOVATUM Sacc. Syll. Fung. iv. 179; Mass. Fung. Fl. iii. 337.

It is absolutely certain that this is merely the young stage of *T. roseum* Link. I have watched the growth of specimens of this fungus many scores of times, and seen the gradual transition from one to the other. One can see a single spore produced at the apex of the conidiophore, but in such cases it is always obliquely placed, not central and terminal; soon another grows, also obliquely placed, and on the opposite side to the first one; then three arranged like a trefoil, and occasionally four. At first the whole fungus is white, but when older it assumes a beautiful rosy tint, the colour, however, being most marked in the mycelium, the conidia are often but faintly coloured.

Moreover, I can see no real difference between these and *Cephalothecium candidum*; the latter name could be applied accurately when a specimen has developed four conidia at its apex, but has not yet assumed the rosy colour, as occasionally happens. The differences in the dimensions given for the spores easily fall within the limits shown by a single tuft, *viz.* from 14 × 6 μ to 19 × 10 μ. When rosy, this becomes *C. roseum*.

23. ARTHROBOTRYS OLIGOSPORA Fres. Beitr. t. iii. f. 1–7; Sacc. Syll. Fung. iv. 181. See Journ. Bot. 1884, p. 198, t. 246, f. 3.

Conidia few together, obovate, 30 × 15 μ or more; hyphæ forming a white stratum, at the base of an old *Angelica* stem, Alvechurch (Ws.), May.

Saccardo considers this as a variety of *A. superba* Corda, which may well be true. It is also stated that *A. oligospora* is sometimes rosy, and Harz maintains that *Arthrobotrys* is only a more highly developed form of *Trichothecium*, which is also possible. (See remarks on the preceding species.) If these suggestions are well founded, it would seem that all the following names apply to varying states of one species: *Trichothecium roseum*, *T. candidum*, *T. obovatum*, *Cephalothecium roseum*, *C. candidum*, *Arthrobotrys superba*, *A. oligospora*, *A. rosea*, not to mention others. Nothing but cultures under diverse conditions can decide this point; the differences given in systematic works, including the dimensions of the conidia, are of the kind that I have found to vary in a single growth.

DIDYMOCLADIUM Sacc. Fertile hyphæ erect, divided above into branches arranged in whorls of three. Conidia on the inflated tips of the branchlets, ellipsoid, 1-septate, hyaline, catenulate.

152. DIDYMOCLADIUM TERNATUM Sacc. Syll. Fung. iv. 187; Trans. Brit. Myc. Soc. i. 114.

Tufts woolly, white; hyphæ ascending, sparsely septate, with few subopposite or ternate branches, passing into ternate filiform branchlets, which are inflated at the summit. Conidia ellipsoid, 1-septate, at length constricted, hyaline, in long chains.

On *Stereum* and *Polyporus*, Packington Park (Wk.), July, 1886.

153. RAMULARIA TARAXACI Karst. Sacc. Syll. Fung. iv. 207.

Epiphyllous, spots small, roundish, with purple margins, like those of *Ovularia obliqua*. Hyphæ in little tufts, simple or with one or two very short branches at the summit, hyaline, occasionally septate, averaging 50 × 3–4 μ. Conidia occasionally in short chains, at first continuous, then 1–3-septate, up to 30–32 μ long, 3·5–4 μ broad. (Tab. 515, fig. 11.)

On leaves of *Taraxacum*, Lodge Hill, Selly Oak (Ws.), September.

154. RAMULARIA PRIMULÆ Thüm. Sacc. Fung. Ital. t. 985; Syll. Fung. iv. 214.

Tufts minute, crowded on pale patches, without a conspicuous border, chiefly epiphyllous; hyphæ 60–70 × 4 μ, continuous, rarely branched, bearing a few cylindrical, slightly fusoid conidia, which are continuous, hyaline, and about 25 × 4 μ. (Tab. 515, fig. 8.)

As stated above under *Ovularia primulana*, I have found a fungus agreeing with this description, but also exhibiting a much more mature form as there described. The one described here is intermediate between the two extremes.

TRINACRIUM Riess. Hyphæ thin, filiform, continuous, mycelium creeping, almost non-existent. Conidia triradiate, hyaline, radii cylindrical, 2-pluriseptate.

155. TRINACRIUM SUBTILE Riess in Fres. Beitr. p. 42, t. 5, f. 14–17; Sacc. Syll. Fung. iv. 231; Fung. It. t. 966.

Conidia triradiate, radii 30–35 (or even 40) × 4 μ, 4–5-septate, tapering gradually from the base, not constricted at the septa.

On the hymenium of *Peniophora rosea*, Eardisland (Hereford), August. Rays occasionally even 6-septate.

156. **Fusoma tenue** *m.* Tenuissime effusum, oculo inarmato haud visibile. Conidiis clavato-fusiformibus, 3–7-septatis, haud constrictis (septis tenuibus), hyalinis, 25–45 × 7½–8 μ. (Tab. 515, fig. 9.)

In caule emortuo *Angelicæ*, Alvechurch (Ws.), Jun. The youngest conidia seen were 3-septate, 25 μ long; then the middle cells are again divided, making them 5-septate; finally the process is repeated by the two central loculi, and thus the spore, when 45 μ long, is 7-septate.

TRIDENTARIA Preuss, emend. Hyphæ in conidia in formam tridentis connata abeuntes. Conidia oblonga v. clavata.

157. **Tridentaria setigera** *m.* Tenuissime effusa, alba, haud conspicua. Hyphis trilocularibus, deorum attenuatis, sursum flabelli ad instar expansis applanatisque; conidiis tribus in basi palmatifida connatis, 10–15 × 3·5 μ, oblongis, 1–3-septatis, hyalinis, apice rotundatis v. subacutatis, in utroque latere cum seta acuta hyalina septata consociatis. (Tab. 515, fig. 10.)

In caule emortuo *Angelicæ sylvestris*, sociis *Fusomate tenui* et *Mollisia atrata*, Alvechurch (Ws.), Jun.

This species may well be placed in the genus incompletely described by Preuss (*Linnæa*, 1852, p. 74), if a few slight alterations are made.

158. **Hormiscium callisporum** *m.* = *Torula* (?) *callispora* Speg. Sacc. Syll. Fung. iv. 262.

From a creeping mycelium arise short erect chains of conidia (or joints), forming a dusky effused patch. Chains up to 80 μ long, fusiform, straight or slightly curved, consisting of 4–10 joints. Joints 6–10 μ broad, nearly spherical, at the ends pale olive and smooth, in the middle of the complete chains (of 10 conidia) they are larger, darker, and minutely but distinctly asperulate. A few of the ripest conidia are rough and completely opaque. (Tab. 516, fig. 1.)

On stems of an Umbellifer, Longdon Green (St.), September. This seems to be identical with Spegazzini's species, though not quite so completely evolved. The joints separate from one another with difficulty.

159. STACHYBOTRYS LOBULATA Berk. Sacc. Syll. Fung. iv. 269 Mass. Fung. Fl. iii. 368.

Sterile hyphæ creeping over the matrix, delicate, colourless. Fertile erect, 5–6 μ diam., alternately cymosely branched, brown, darker upwards, when perfect minutely asperate. At the apex is a crown of 5–7 clavate sporophores, each 15 × 5 μ, obtuse, smooth, and often paler than the apex of the hypha, from which the whole crown easily separates. Heads of conidia varying in size according to age, spherical, deep black, held together by a little mucus. Conidia elliptic, pale at first and smooth, with two very small guttulæ; then darker olive, with larger guttulæ, but still smooth; finally opaque brown or black (guttulæ invisible), 9–10 × 6μ, globose in end view, minutely asperate.

Berkeley described the hyphæ as paler *upwards* instead of *downwards*, probably by a slip of the pen. This species is easily propagated by putting a few spores on damp blotting-paper, and keeping under a bell-glass. Ultimately *Chætomium chartarum* always makes its appearance on the same paper, so that probably the *Stachybotrys* is a conidial stage of the other, but I have not tried any cultivations with adequate sterilization of the matrix. There is no reason for considering *S. asperula* Mass. and *S. scabra* Cooke & Harkn. as species distinct from *S. lobulata*.

160. PERICONIA PYCNOSPORA Fres. Sacc. Syll. Fung. iv.; Trans. Brit. Myc. Soc. i. 71.

Conidiophores ½–1 mm. high, aggregated in a distinct black spot, but not or rarely crowded, rigid, shining, black (dark brown and almost opaque by transmitted light), 12–15 μ diam., with few (4–7) septa, lobed and slightly inflated and paler at the apex, where they are faintly denticulate. Conidia globose, catenate, basipetal, brown, slightly paler than the hyphæ, without any evident apiculus, distinctly and beautifully muriculate, 15–20 μ; head of conidia globose, 50–70 μ diam. (Tab. 516, fig. 2*a*.)

The conidia are plainly concatenate, growing like those of *Penicillium* with the youngest at the base; when water is added, they immediately separate. Whether *P. byssoides* (Mass. Fung. Fl. iii. 369) is the younger state of this is uncertain; the size of the spores there given, 5–7 μ, seems to render it improbable.

On dead herbaceous stems, Sutton Coldfield, Studley, Coleshill, &c. (Wk.), November–May.

161. PERICONIA DESMAZIERI Bon. Sacc. Syll. Fung. iv. 274.

Mycelium a few, creeping, colourless hyphæ at the base; conidiophores erect, nearly straight, about 100 μ high, 4–5 μ thick, hyaline at base and becoming fuscous upwards, with only one or two septa, bearing at the top a cluster of oblong lobes which are sometimes brown, at others nearly colourless. Conidia collected into a round black head which is 25–30 μ diam., elliptic-oblong, fuliginous-fuscous, opaque, obtuse at each end, smooth, 11–14 μ × 4–5 μ. (Tab. 516, fig. 2*b*.)

On stems of *Heracleum*, Bradnock's Marsh (Wk.), October. A minute species, differing apparently from all others in having the base of the stem paler than the upper part. It approaches *Stachybotrys papyrogena* Sacc. (Syll. iv. 269), but is plainly different. Other species of *Periconia*, such as *P. digitata* (Syll. iv. 274), have lobe-like sporophores at the apex; the distinction from *Stachybotrys* appears to lie in the fact that in the latter the sporophores are distinct cells, not merely lobes of the hypha.

162. ZYGODESMUS FULVUS Sacc. Syll. Fung. iv. 286.

Golden-ochraceous, variously effused; hyphæ intricately branched, 6–10 μ thick, without clamp connections, yellowish;

conidia globose, terminal, 8–9 μ diam., subfuscous or yellowish, remarkably and radiately echinulate. (Tab. 516, fig. 3.)

On rotten wood, Selby (Yorks), *Mr. C. Crossland*, November. It is doubtful whether this belongs to the species of Saccardo, as the conidia were always terminal, frequently in fours, like the spores of *Agaricus*, but without sterigmata so far as could be seen, at the most borne on faint denticules. The beautifully spinous form of the conidia is especially well marked.

163. **Acrotheca canescens** Grove. (Journ. Bot. 1907, p. 69, t. 485, f. 1*c*, *d*.)

Conidiophores wavy, pale-brown, cylindrical, septate, about 100 μ long, 4 μ thick, paler upwards. Head of conidia rather large (16–20 μ), shining white. Conidia oblong-fusiform, somewhat acute at each end, hyaline, 10–12 × 3 μ.

On rotten wood, Studley Castle, March. These are the conidia of *Dasyscypha canescens* (Phill.) Mass. Fung. Fl. iv. 346, in company with which they grew; see Journ. Bot. *loc. cit.*

164. HORMODENDRON CLADOSPOROIDES (Fres.) Sacc. Syll. Fung. iv. 310; Grove, Journ. Econ. Biol. vi. pt. 2, p. 44, pl. 4, figs. 9–15 (1911).

Mycelium whitish, hyphæ 3–5 μ diam. Conidiophores erect, cylindrical, branched above, articulations of branches fusoid. Chains of conidia short, basifugal, branched, diverging. Conidia ovoid or elliptic, somewhat apiculate at each end, 6–7 × 3·5 μ, pale olivaceous, the ultimate conidia nearly round.

On the cut surface of a vine stem, Bulkington (Wk.), *Mr. Compton Till*. Forming a thin dirty green stratum with a whitish border.

(To be continued.)

NEW WEST AUSTRALIAN PLANTS.*

By W. V. Fitzgerald.

LEGUMINOSÆ.

Acacia inæquiloba. Fruticosa, glabra, ramulis paulo glaucescentibus striatis vel obscure angulosis, phyllodiis patentibus subulatis rigidis rectis vel falcatis apice sensim pungentibus basi vix attenuatis margine modice incrassatis nervo medio manifesto glandula conspicua ad medium marginis superi, stipulis subulatis caducius, pedunculis solitariis gracilibus basi bracteatis quam phyllodia brevioribus, bracteis multis late ovatis brunneis concavis striatis sæpe longe persistentibus, capitulis globosis 12-floris, floribus 4-raro 5-meris, bracteolis quam flores longioribus persistentibus late ovatis concavis striatis brunneis ciliolatis,

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* Specimens of the plants here described, with the exception of *Acacia inæquiloba* and *Regelia sparsifolia*, are in the National Herbarium.

calyce tenui glabro perinæqualiter lobato quam corolla breviori, tubo lato brevique, lobo longissimo corolla subæquali lineari-lanceolato 2–3 brevioribus linearibusque et uno perbrevi latoque sæpe pæne obsoleto, corolla tenui glabra, petalis ecostatis latis obtusis usque ad medium connatis, ovario tereti glabro, stylo tenui laterali.

Loc. Victoria Desert, Castra 56; *R. Helms* (Elder Exploring Expedition).

Frutex. Phyllodia 1–2 unc. long. Bracteæ 1–1½ lin. long. Bracteolæ circiter 1 lin. long.

The foregoing description is drawn up from two small flowering specimens in the National Herbarium, Sydney.

In foliage and general aspect bears a close resemblance to *A. genistoides* A. Cunn., differing in the bracteate peduncles, conspicuous, differently shaped bracteoles, fewer, mostly 4-merous flowers, markedly distinct calyx, and broader thin unribbed petals.

Acacia Ewartiana. Fruticosa, glabra, ramulis tenuibus pæne teretibus sæpe glaucescentibus, phyllodiis lineari-teretibus erectis vel recurvatis apice rectis vel incurvatis obtusis plurinerviis, stipulis perminutis caducis, pedunculis geminatis raro solitariis gracillimis omnibus basi bracteatis, bracteis singulis parvis lineari-lanceolis ciliolatis, capitulis globosis plerumque 20-floris, floribus 5-meris, sepalis liberis spathulatis ciliolatis, petalis duplo longioribus supra medium connatis lævibus apice obscuris coloratis paulo incrassatis, ovario glabro, stylo filiformi quam stamina longiora.

Loc. Cowcowing; *Max Koch* (no. 998).

Frutex 2–4 ped. alt. Phyllodia plerumque ¾–1 unc. long. Pedunculi 1–1½ lin. long. Fructus ignotus.

Allied to *A. brachyphylla* Benth., as far as the specimens show, differing in larger usually recurved phyllodia with straight or recurved tips. The flowers of Bentham's species have not been described. Named in compliment to Professor Ewart, Government Botanist of Victoria, from whom I first received specimens.

Acacia eremophila. Fruticosa, copiose ramulosa, ramulis teretibus junioribus cano-tomentosis cito glabris, phyllodiis tenuibus teretibus rectis scabro-hirsutis apice breviter acutis vel pæne pungenti-recurvatis subtiliter 3–4-nerviis, stipulis obliteratis, pedunculis solitariis vel 2–3-nis perbrevibus, capitulis globosis 15–20-floris, floribus plerumque 5-meris, sepalis breviter connatis spathulatis obtusis ciliolatis, petalis duplo longioribus semi-connatis pæne acutis manifeste uninerviis, leguminibus (immaturis) linearibus rectis vel paulo curvatis compressis undulatis cano-pubescentibus.

Loc. Apud planities arenosas, Cowcowing; *Max Koch* (nos. 1024 et 1024 *a*).

Frutex 1½–3 ped. alt. Phyllodia 1½–2 unc. long.

Allied to *A. leptoneura* Benth., differing principally in the fewer nerved quite terete phyllodia and in the hoary tomentose pod. It is still further removed from *A. Tratmaniana* W. V. F., which it resembles in having the foliage of some forms of *A. ephedroides*

Benth., but is readily distinguished from that species by the flowers being in globular beads and mostly 5-merous.

Acacia brachyclada. Suffruticosa vel fruticosa, glabra viscidulaque, ramulis brevibus teretibus vel vix angulosis, phyllodiis oblique ovatis vel orbicularibus firmis apice obtusis breviter apiculatis margine nervosis tuberculatis nervo medio inconspicuo, stipulis obliteratis, pedunculis solitariis gracilibus quam phyllodia longioribus, capitulis globosis 8–12-floris, floribus parvis viscidis 5-meris, sepalis perminutis vel obsoletis, petalis liberis obtusis levibus, leguminibus (junioribus) linearibus compressis incurvatis glabris viscidisque.

Loc. Kellerberrin; *F. H. Vachel.*

Suffrutex vel frutex. Phyllodia 1–1¼ lin. long. Pedunculi 1½–2½ lin. long.

Differs from all other members of the series *Uninerves*, subseries *Brevifoliæ*, in the reduced foliage and in the calyx being usually suppressed.

Acacia Kochii. Fruticosa, elata, glabra, ramis modice robustis teretibusque, ramulis spinosis reductis tenuibus rectis rigidissimis, phyllodiis plerumque fasciculatis infra spinas oblique obovatis vel oblanceolatis aliquanto falcatis obtusis breviter stipitatis nervo medio manifesto penninerviis, stipulis obsoletis, pedunculis gracillimis solitariis vel geminatis axillaribus vel infra spinam sitis, spicis plurifloris phyllodiis subæqualibus, floribus 5-meris, calyce sericeo tenui quam corolla multo breviori breviter lobato lobis latis obtusisque, petalis ovatis obtusis usque infra medium coalitis, leguminibus linearibus aliquanto contortis inter seminaque contractis valvulis biconvexis striatis glaucescentibus.

Loc. Rabbit-proof fence east of Watheroo; *Max Koch.*

Frutex 10–15 ped. alt. Spinæ ¼–1 unc. long. Phyllodia 6–9 lin. long., 2–2½ lin. lat. Pedunculi 3–4 lin. long. Spicæ 3–4 lin. long. Legumen 3–4 unc. long. Semina ignota.

Occupies a position among the series *Uninerves* similar to that of *A. triptera* Benth. among the *Continuæ*, and *A. oxycedrus* Sieber, *A. verticillata* Willd., and allied species among the *Pungentes.*

Acacia Hynesiana. Fruticosa, gracillima, copiose ramulosa, ramulis (junioribus) sparse viscidulo-tomentosis cito glabris teretibus flexuosis pendulis, phyllodiis lineari- vel filiformi-teretibus flexuosis basi deorsum recurvatis sursum apice rectis vel uncinatis obtusis 4-nerviis obscure quadrangulosis, stipulis obsoletis, spicis perbreviter pedunculatis vel sessilibus, rhachi glabro, floribus 4-meris, calyce sparse sericeo breviter lobato, petalis duplo longioribus liberis conspicue uninerviis, leguminibus breviter stipitatis linearibus vix inter semina contractis valvis biconvexis parce viscido-sericeis, seminibus oblongis obscure brunneis funiculo longe plicato sensim incrassato sursum arillo albido pæne clavato.

Loc. Planities arenosa prope Kellerberrin; leg. *W. V. F.*

Frutex 6–10 ped. alt. Phyllodia 3–5 unc. long. Spicæ 4–6 lin. long. Legumina sæpissime 3 unc. long.

Allied to *A. ephedroides* Benth. and *A. merinthophora* Pritzel.

The pendant branchlets and peculiar foliage impart to the species a remarkable appearance. Named in compliment to Miss S. Hynes, B.A., Botanical assistant at the Sydney Herbarium.

DROSERACEÆ.

Drosera Andersoniana. Annua, bulbosa, glanduloso-hirsuta, caulibus erectis gracilibus flexuosis, foliis radicalibus rosulatis spathulatis petiolatis, foliis caulinis alternis peltatis orbicularibus longe petiolatis, cymis laxe furcatis, bracteis linearibus, floribus paucis subrubris vel rubris, sepalis ovato-lanceolatis obtusis conspicue ciliolato-dentatis breviter glanduloso-hirsutis, petalis ovatis integris, antheris ovatis, stylis tribus abbreviatis quisque infra medium multifurcatis ramulis linearibus, seminibus numerosis lineari-cuneatis.

Loc. Cowcowing; *Max Koch.*

Annua. Caulis 6–9 unc. alt. Folium radicale 2–3 lin. lat., petiolus 3–6 lin. long., caulinorum lamina 2–3 lin. lat., petiolus 9–12 lin. long. Bracteæ plerumque 1½–2 lin. long. Sepala 2–2½ lin. long. Petala 4–4½ lin. long.

Distinguished from all forms of *D. peltata* Smith by the orbicular stem leaves, cymose inflorescence, large pink or red flowers, and differently shaped seeds. Named in compliment to Mr. H. C. L. Anderson, Under-Secretary for Agriculture of New South Wales.

MYRTACEÆ.

Regelia sparsifolia. Suffruticosa, ramis foliisque glabris, foliis sparsis patentibus late vel anguste ovatis obtusis breviter petiolatis planis vel paulo concavis trinervosis, capitulis globosis, rhachi albo-tomentosa, bracteis late ovatis brunneis striatis utrinque hirsutis quam calyx longioribus, floribus numerosis, calycis tubo obscure quadrangulari hirsuto lobis latis obtusis apice longe hirsutis quam tubus multo brevioribus, petalis rubro-purpureis calycis lobis duplo longioribus late ovatis vel pæne orbicularibus concavis tenuibus ciliolatis, filamentis rubro-purpureis perbreviter unguiculatis 3–5 fasciculosis, antheris flavis loculis apice dehiscentibus, capsulis perpaucis aggregatis obscure angulosis levibus basi latis sursum contractis, orifico angusto truncato loculis dispermis.

Loc. Esperance Bay; *F. J. Daw* (Nat. Herb., Sydney).

Suffrutex nec ultra 1 ped. alt. Folia 2–3 lin. long. Calyx circiter 1 lin. long. Petala circiter 2 lin. long. Stamina circiter 2 lin. long. Capsula basi 1½ lin. lat.

The scattered leaves and extreme shortness of the staminal claws distinguish this species from other members of the genus. In general aspect and foliage it resembles forms of *Eremæa beaufortioides* Benth., whilst the staminal structure closely approaches that of *Beaufortia micrantha* Schauer.

COMPOSITÆ.

Angianthus axilliflorus. Annua, glabra, erecta, ramosa, foliis linearibus crassisque vel semiteretibus obtusis basi latis, involucris

primariis 0, capitulis terminalibus hemisphæricis compactis, flosculis confertim approximatis quisque flosculus apud axillam bracteæ bractea æquilonga vel vix longiore ovata obtusa vel acuta herbacea flosculis solitariis vel geminis 5-meris, subinvolucrorum bracteolis 4 hyalinis lanceolatis planis vel concavis 2 intimis quam flosculis longioribus extimis brevioribus angustioribusque, acheniis hirsutis, pappi setis multis reductis connatis palæaceo-squamosis.

Loc. Cowcowing; *Max Koch* (no. 1196).

Nec ultra 6 unc. alt. Folia 3–5 lin. long. Capitula 2–3 lin. lat.

An anomalous species, lacking a general involucre and evident receptacle.

AMARANTACEÆ.

Ptilotus (TRICHINIUM) **eriostrichus.** Suffruticosa, paniculatim ramosa, ramis teretibus dense pilosis pilis brevibus intricatis albido- vel cano-lanuginosis, foliis ovatis vel lanceolatis obtusis modice tenuibus breviter petiolatis marginibus integris recurvatis pagina supera obscuro-viridi sparse lanuginoso-hirsuta infera dense albido-lanuginosa hirsuta nervo medio manifesto inconspicue penninerviis, inflorescentia laxe et irregulariter paniculata, pedunculis lanuginoso-hirsutis, spicis hemisphæricis vel paulo elongatis, bracteis perianthio sesquilongis late ovatis obtusis sparse hirsutis, bracteolis angustioribus et longioribus omnibus ecostatis, perianthiis stramineis dimidio infero copiose hirsuto, segmentis breviter connatis extimis apicibus glabris dentatis latis intimis paulo brevioribus et angustioribus omnibus intus glabris pilis quam perianthium longioribus rectis articulatis, filamentis breviter connatis brevibus sæpe 2–3-antheriferis reductis basi dense lanuginoso-hirsutis antheris ellipsoideis, ovario glabro, stylo terminali.

Loc. Cowcowing; *Max Koch* (no. 1217).

Suffrutex 1 ped., vel altior. Folia nec ultra 1 unc. long. Pedunculi 1–2 unc. long. Spicæ 6–9 lin. long. et lat. Bracteæ 2 lin. long. Bracteolæ 3 lin. long. Perianthia vix 4 lin. long.; hujus pili 5 lin. long.

Allied to *P. striatus* F. v. M.; differing in the branches not striate, the presence of indument, broader recurved margined leaves, smaller perianth with proportionately longer hairs, the not dilated filaments, and the central style.

PROTEACEÆ.

Petrophila incurvata. Fruticosa, rigide erecta, ramis foliisque glabris, foliis incurvatis rigidissimis trilobatis basi petioloideis perlongis compressis vel pæne teretibus sursum anguste dilatatis lobis brevibus integris vel nonnunquam breviter bi- vel tri-fidis omnibus planis late linearibus apicibus breviter pungentibus, strobilis sessilibus vel breviter pedunculatis terminalibus ovatis vel ovato-oblongis, bracteis extimis comparate paucis villosis late ovatis apicibus longe setaceis tarde deciduis, squamis quam bracteæ multo longioribus late ovatis obtusisque primo omnibus dense villosis ultimo basibus duris villoso-tomentosis sursum glabris, perianthiis sericeo-villosis, segmentis cito liberis, stylo

sparse hirsuto, stigmate fusiformi continuo glabro anguloso, nucibus ovatis acuminatis crasse compressis facie intima pæne glabra extima dense hirsuta marginibus exalatis longe ciliolatis.

Loc. Watheroo, rabbit-proof fence; *Max Koch* (no. 1522).

Frutex 3–4 ped. alt. Folia omnia 3–4½ unc. long.; lobi 9–12 lin. long. Strobilus 9–12 lin. long., 5–6 lin. diam., interdum partim abortivis et brevibus. Perianthium 5–6 lin. long.

Readily distinguished from allied species by the foliage. It seems best placed in section *Symphyolepis* Endl., its nearest affinity appearing to be *P. macrostachya* R. Br.

Persoonia pungens. Suffruticosa, diffusa, ramulis albido-tomentosis, foliis inflorescentiisque glabris, foliis ovatis vel ovato-lanceolatis pungentibus breviter petiolatis rigidis obscure uni-nerviis, pedicellis subterminalibus axillaribus solitariis, perianthiis flavis segmentis dorso apiculatis, antheris quam perianthium brevioribus connectivo ultra loculos non producto, ovario conspicue stipitato glabro uniovulato, stylo modice robusto antheris æquilongo.

Loc. Kellerberrin; *F. H. Vachel.* Prope Kellerberrin; leg. *W. V. F.*

Suffrutex 1–1½ ped. alt. Folia plerumque 5–6 lin. long. Pedicelli vix 1 lin. long. Perianthium circiter 4 lin. long. Fructus ignotus.

The species belongs to the section *Amblyantheræ*, its nearest western affinity being *P. Leucopogon* S. Moore. It differs from that plant, among other characters, in the foliage, the glabrous perianth, and in the uniovulate ovary. Among eastern species it more closely approximates *P. oxycoccoides* Sieber, from which it is readily distinguished by the flat pungent-pointed leaves and the dorsal points to the perianth-segments.

THE SHEPHERD'S PURSE AND CULTIVATION.

By E. Adrian Woodruffe-Peacock, F.L.S.

The Shepherd's Purse (*Capsella Bursa-pastoris*) is an areal follower of cultivation in Lincolnshire, as a rule. It requires full sunlight, and half or full shelter from the wind. So far as my observation yet extends it is merely visited by Diptera while resting in the high summer months, and by Thrips (Thysanoptera) when in large flights at such times as every flower, even grass flowers, are visited by them. In both cases there was pollen on the insects or their legs and cross-fertilization might accrue; though I regret I do not know how to prove it does. It flowers, *i.e.* sheds active pollen, every month of the year—every day of the year, as a matter of fact, when the thermometer is above 36 degrees Fahrenheit, provided there is bright sunlight during some part of the daylight hours. *Poa annua* and Groundsel are the only two other species which flower more continually; they can do with less sunlight. Its seeds are water-carried, but how long they remain fertile during such carriage I cannot say. For the most part they depend on wind-carriage, though human carriage, directly or indirectly, is common.

Ten forms, as I call them, are given in Mr. Druce's *List of British Plants*; many of them are fairly common, but are hardly worth considering except by specialists. There is, however, another form, which I must name later, which I have not found referred to in any work yet, though it is of remarkable evolutionary interest.

The Shepherd's Purse is recorded for every artificial division of Lincolnshire; also for thirty-three out of, say, the fifty rock-soils of this county, *i. e.* for all that have been fully worked up to date. It is found on most compound soils too. I have never yet detected it on pure untouched peat, but with that exception consider it universal. Where raw peat is mixed in any way with foreign matter, and men are present, it soon appears; as, for example, on the tramway for bringing turf to the mill on Thorne Waste, in West Yorkshire. In this case engine-fire clinkers had alone been used to make the road-bed firmer, but that was enough. The acid of the peat soon caused decomposition in the added matter, and the plant was there, as far as the clinker influence extended, on both sides of the rails. The localities it frequents are innumerable. It is a species of broken ground, whether natural or artificial. I can only give a short selection of localities from my large collection of notes. Approximately natural ones are becks, and river banks and sides, and pasture. In these places, as sheep are specially fond of it and eat it to death, it is only rarely found, unless it is protected by nettle-beds, or by dung, or on bank slips, or where cattle have cut up the turf, as by standing by gates or in deep wheel-tracks. In man-made localities it is universal, from the macadam and old stone-heap places of the roadsides, through all classes of cultivation, to the covering of sheltered mud-topped walls. The only place where I did not expect to find it was a closely rabbit-eaten little-used sand-lane at Blyton. There it was in the tracks only, as it had been picked up and left by the passing wheels. When I say that *Anthriscus vulgaris* was represented in that lane by perfect little plants four to six inches high, buried in moss, it will be seen what the struggle for existence is like there.

Under the date June 23rd, 1893, I have the following note on the Daisy:—"The purple flagged form is less eaten than the white in over-stocked pasture." At this distance of time I do not remember the circumstances under which this note was originally made. I bothered myself about the purple or "Abel Daisy" over thirty years ago, and called this colour-form, for the sake of distinction, *pascua*, but have few special "stock" records in regard to it. I never expected to meet with another species showing a like evolutionary tendency, but *Capsella* does. The little parish of Newstead, on Ancholme-by-Brigg, is a farm which was one of the original Gilbertine priories, founded by Henry II. in the year 1173.

The portion of it I have to refer to is a bed of sandy glacial gravel, rising above the peat level of the Ancholme fen around.

In the days before the foundation, and till long afterwards, Newstead was an island, called Ruckholme, *i.e.*, Rook-island, in the charter conveying it. There is a large rookery on the old island still. In the middle of one of its pastures, even now of only medium quality, is a round barrow, most probably of late Neolithic or early Bronze Age. Not very far away from it is found a grass-covered gravel-pit from which the material for the barrow was most undoubtedly taken. Geologically they are just the same. When it was first or last used it is quite impossible to say. It is far larger than would be required for supplying the barrow material, but no doubt it was requisitioned later by the Priory people when they made their "causeys," as they rightly called them, to Cadney on the north, and to Hibaldstow on the south, over the fen level. There is no evidence beyond the fact that the pit is there, and that such a gravel was certainly obtained for the purpose. This also is the only old pit near, and heavy carriage was an almost insuperable difficulty in early times. Let this be as it may, the close pasture has conquered all the pit, which was originally twelve feet deep at least, with the exception of the steep slope of its former face. There with difficulty, and greatly aided by the steep incline, the following species still retain a foothold:—*Alchemilla arvensis*, *Capsella*, *Cerastium arvense*, *Erophila vulgaris*, *Geranium molle*, *Stellaria media*, *Trifolium dubium*, *T. striatum*, *Veronica arvensis*.

The Shepherd's Purse is quite typical in form, but in size and colour it is abnormal. It is purple-stalked instead of green, with purple sepals and purple or purple-white petals. It is a pure *pascua* form. It must be clear to any geologist, soil-student or botanist, who studies it, that this pit has not been used for ages. Why, then, have these species retained their hold so long, despite the all-conquering turf around? Stock—sheep, especially—rabbits, and birds seeking grit-stones, have all helped to keep little broken patches on the slope of the old working face, such as are found to-day. I myself have seen rooks from the rookery over the hedge "gritting" on the old pit-face after snow has melted there earlier than elsewhere. What is more important still is that this pasture, even under modern cultivation, is only of medium quality. It can only grow young stock well; it cannot fatten them; therefore it must have been a very poor pasture indeed before it reached its present state of fair productivity. Now, while it remained unenclosed and fairly natural, it would certainly be the home of such species as are now forced to survive on the old working face of the gravel-pit.

Between the pit where this curious *pascua* form of Shepherd's Purse is found and my house, with a wide mass of carr peat lying between them, there is another shallow gravel-pit. It is in the same rock-bed, sandy glacial gravel, but is of much later date, after road-stoning came into vogue. It, too, has not been used for many years, and is now fully grown over by grass. It is in a meadow, I regret to say, and not a pasture; for the Shepherd's Purse is much rarer in meadow than pasture. One side of it, however, is along the hedge dividing it from a pasture; and from this pit, where it is now only rarely found, *Capsella* has escaped through the hedge into the pasture, and in the immediate neighbourhood of the old pit it is protected by nettles (*Urtica dioica*). It is the normally coloured form, however, like the one found on Thorne Waste, or in the rabbit-eaten lane at Blyton, not the *pascua* form of the pre-historic pit at Newstead. In other words, neither on the peat-bog, nor in the lane, nor in the pasture from this grassed down modern pit, has there been time for natural protective-colour selection to do its work, as there seems to have been at Newstead. I have noticed this form in other places, but never as perfectly developed as at Newstead.

SHORT NOTES.

Mertensia maritima in Norfolk.—In the *Botanical Exchange Club Report* for 1910 (1911) there is a record of the above species for the coast of Norfolk (Prof. F. W. Oliver). In the year 1905 it was seen on that coast by Mr. W. H. Burrell, pointed out to him by a resident. He kindly sent me a specimen with a map and drawing of the neighbourhood, and published a note on its occurrence in Trans. Norf. & Norw. Nat. Soc. viii. 201 (1906). It grows on the shingle beach, and its survival for six years is interesting. The situation is a lonely one, rarely trodden except by an ornithologist or a stray botanist. No ballast is shot near, the vessels only bringing coal, salt-cake, granite, and manure, and no Scotch fishing-boats call there. In England the plant occurs on the west, south to Walney Island (54° 5′ N. lat.), Anglesea (extinct), Carnarvon (53° N. lat.), and formerly at Great Orme's Head. On the east, south to Holy Island and Bamborough (Fox sp.) on the coast of Northumberland. In Ireland at Wicklow Head (53° N. lat.), where it was formerly plentiful, but in 1872 had become rare (Cyb. Hib. ed. 2, 242, 1898). This seems to be the most southerly station, but it is said to have occurred at Beal Castle beach (52° 35′ N. lat.), Cyb. *l.c.* Its Norfolk station is about 52° 55′ N. lat. It has been reported for Kent, Hants, Devon, Cornwall, and Cardigan, but with no confirmation since 1805.

Its distribution outside the British Isles is:—*Europe:* Spitzbergen, Jan-Mayen, Iceland, the Faroes, North and South Norway, Sweden, Bohutslan (57° 30′), Finland, south to 64° 39′, Russian and Finnish Lapland, Denmark, Jutland at 57° N. lat. *Asia:* Along the Arctic coast to Behring Strait. *America:* Greenland. Canada south to 49°, and to Massachusetts in the United States (41° N. lat.).

Thus there is no climatal or distributional reason against its being a Norfolk plant. Norman (Index. Suppl. Nat. Spec. (1864), p. 28) gives a form, "epruinosa, foliis obscuris virescentibus," otherwise it is one of the species that has escaped the splitter.—Arthur Bennett.

Dorset Plants.—In Mr. C. E. Salmon's interesting and careful paper in last month's Journal (1911, p. 364), an asterisk is placed before *Stachys palustris* × *sylvatica* as if it were new to the county. It is only new to District G, there being five localities for this hybrid in the *Flora of Dorset*, and one more in my *Flora of Bournemouth.* In the paper that follows Mr. Salmon's, on Lyme Regis, Mr. Pugsley gives several species as new "to that district." If he means District A, *The Flora of Dorset*, ed. 2 (1895), cannot have been consulted. In that work *Fœniculum vulgare* and *Daphne Laureola* (Uplyme, by the way, is in Devon) are recorded from Lyme; *Petasites ovatus* (as *P. vulgaris* Desf.) is said to be "generally distributed" in the county, and so no stations are mentioned; for *Glyceria procumbens* two localities are given in the District, for *Jasione montana* four, and for *Festuca rottbœllioides* one, the latter under the name of *Poa loliacea* Huds. Last spring Dr. C. E. Moss drew my attention to *Viola silvestris* var. *punctata* Rouy & Foucaud in Edmondsham; and in October he pointed out to me that the perennial *Salicornia* near Poole, and in Hamworthy, was *S. lignosa* Woods, and not *S. radicans* as previously recorded; and together we gathered *S. disarticulata* Moss, which I had formerly taken for a form of *S. pusilla* Woods, and a curious compact form of *Polygonum aviculare* L. var. *microspermum* (Jord.), differing in habit and in a rather broader shorter leaf from the usual form, but having the same undersized fruit. The last two seem to be new to Dorset.—E. F. Linton.

Fossil Fungi.—I should be greatly obliged if any of your readers can tell me of any Fungi from peat, turbaries, or any deposit up to Roman times in Britain. I enclose list of all I can find recorded; I have lost a reference to one found in Chat Moss, which I should be glad to recover:—

Boletus.—Alluvium, River Thames.
Bovista nigrescens.—Loch Lee, Crannog.
Dædalea quercinus.—Loch Lee, Crannog.
Hypoxylon concentricum. — Downham Fen and Thames alluvium.
Polyporus fomentarius.—Cambridge fens.
P. hispidus.—Peat, Crossness, Essex.
P. ignarius.—Loch Lee, Crannog.
P. lucidus.—East Anglian fens (Brit. Mus. Guide).
P. cf. squarrosus.—Peat, Newbury.
Rhytisma salicinum.—Lake dwelling at Glastonbury.
Sphæria concentrica.—Fen peats, Skertchley.

Communications may be sent to me at 14, Ruskin Road, Ipswich.—Alfred Bell.

Late Flowering of Hawthorn.—During the drought of July and August last the Malvern Hills suffered in many places from extensive fires, which destroyed the Bracken and grasses and seriously injured the Hawthorns, which are abundant on the eastern slopes at Malvern Wells. Within a few days of the date of the fires, new fronds of Bracken were unrolling through the ashes, and patches of fungi were frequent upon the surface. In October, the Hawthorns that were badly scorched came into flower, in places abundantly. This flowering was confined to the injured trees or, in a few instances, to trees which, apparently themselves uninjured, yet stood in the midst of fire that had consumed the herbage beneath them. On December 3rd I gathered sprays still in fair condition, with blossoms and buds, and sweetly scented.—RICHARD F. TOWNDROW.

MENTHA ROTUNDIFOLIA IN BERKS.—In September last I found a small patch of this Mint in full flower on rough ground at the foot of the railway embankment at Hampstead Norris, Berks. Though the locality has been well worked for plants in the past, this seems hitherto to have escaped detection. It is on record for the adjoining counties of Surrey, Hants, Bucks, Wilts, and Gloucester, but it has not been previously recorded as a Berkshire plant.—A. BRUCE JACKSON.

REVIEWS.

Icones Orchidearum Austro-Africanarum Extra-tropicarum; *or, Figures, with Descriptions, of Extra-tropical South African Orchids.* By HARRY BOLUS, F.L.S., Hon.D.Sc. (Cape). Vol. ii. 8vo, cl. tt. 100, with text. Wesley. Price £2 2*s.* net.

THE appearance of this important contribution to our knowledge of Orchids practically synchronized with the death of its accomplished author, of whom we gave some account in our August issue. "Advancing years and ill-health," he tells us in his preface (dated April last), accounted for the delay in its production, and we may be thankful that he was able to complete the volume before he was taken from us.

The notice which we printed (Journ. Bot., 1896, 484) on the publication of the second part of the first volume gave some idea of the excellence of the work, and of its many claims upon the student of the Orchid family and of South African botany. The importance of figures drawn from living plants is nowhere more conspicuous than in this family, and a large proportion of the plates in this part are so drawn, a note on each indicating this and giving the date when the figure was made. Besides those collected by Bolus himself, living specimens were sent him by collectors and cultivators, and in every case the best material available was employed. His chief helper and frequent companion was Miss H. M. L. Kensit, to whom we are indebted for the biography which appeared in our August number: "her re-discovery, during a violent rainstorm, of *Disa Telipogonis* [t. 70.] on the summit of Table Mountain" is referred to by Bolus with evident pleasure.

Each species is fully described in Latin and in English; the

South African distribution is carefully worked out, and there are numerous critical notes showing minute and accurate knowledge. The genera most fully represented are *Disa* (28 species), *Eulophia* (19 species, one new—*E. Pillansii*), *Satyrium* (13 species), and *Holothrix* (8 species); another novelty is *Mystacidium Aliciæ*, named in compliment to Miss Alice Pegler, its discoverer, to whom *M. Pegleræ* had already been dedicated.

British Plants: their Biology and Ecology. By J. F. Bevis, B.A., B.Sc., & H. J. Jeffery, A.R.C.Sc., F.L.S. Pp. xii, 334. London: Alston Rivers. 1911. Price 4*s.* 6*d.* net.

This is a good specimen of modern botany, which is nothing if not scientific. The days are past when books on botany habitually indulged in purple patches, eked out with scraps of rhyme and other irrelevancies. Now, we have gone almost to the other extreme, and readers are presented with a mass of technical terms, which are doubtless highly instructive, but, especially for beginners, by no means attractive. It might even be well, especially in days when not many are sufficiently well acquainted with Greek to trace the meaning of words derived from that tongue, with which they meet on every page, to furnish a handy glossary of terms, such as are abundantly used in the work before us; as, for instance—to say nothing of "Ecology" itself, which appears in the title—"Hygrophyte," "Tropophyte," "Xerophyte," "Geophyte," "Mesophyte," "Sclerenchyma," and many others. No doubt such terms are useful and even necessary, and their signification is not difficult to gather by those possessed of a moderate amount of scholarship. It cannot be denied, however, that their constant employment must have a tendency to scare away those who are apt to complain of the hard words which they suppose to be inseparable from the study of botany.

It would, however, be a pity should such a notion stand in the way of the service which the book before us is calculated to render to young botanists, for it abounds in accurate information, clearly and tersely put, and is well supplied with useful illustrations. Many details are given of the manner in which plants are adapted to the most diverse habitats. In it will be found various sections which may well attract the attention of the general reader. In particular may be specified those on Parasites, including—confining ourselves to British plants—Toothwort, Dodder, and Mistletoe, and insect-eaters—such as Sundew, Butterwort, and Bladderwort. In this latter connection is repeated the familiar story of the Arum and the flies, which will not be found very easy to verify by observation. It is likewise implied (p. 174) that bees habitually confine their visits to one species of flower at a time, which is not in accord with our own experience. Darwin is said (p. 292) to have died in 1888, instead of six years earlier, and his Natural Selection theory is spoken of as though it were still generally accepted as the explanation of evolution.

Most interesting and astonishing is the account of the partnership of a lichen and an alga, each assisting the life of the other—an alliance which, were it not scientifically established, would seem no less impossible than that which, according to Waterton, is said once to have been found between the cormorant, the bat, and the bramble, and which affords one example more of the marvels beyond the fancies of fabulists which occur unsuspected in Nature on every hand.

J. G.

British Trees, including the finer Shrubs for Garden and Woodland. By the late Rev. C. A. Johns, B.A., F.L.S. Edited by E. T. Cook & W. Dallimore. With 56 full-page plates (24 coloured) and 41 text illustrations. 8vo, cl. pp. xvi, 285. London: Routledge (no date). Price 7*s.* 6*d.* net.

It is no small tribute to the value of the work of C. A. Johns that, after the lapse of more than half a century, it should still be worth reprinting. His *Flowers of the Field*, which first appeared in 1853, is still, in the enlarged and up-to-date version edited by Mr. Boulger (which must not be confused with the very inferior one with which the name of Clarence Elliott is associated), one of the most useful introductions to British botany; and although we have now other books on British trees, the volume before us which has Johns's *Forest Trees of Britain* for its basis is in some respects the most comprehensive and generally interesting in its treatment of the subject.

The editors tell us in their preface that they "have preserved as far as possible the character of the work," but the "tremendous (!) change" which "has taken place in our gardens" has induced them to add descriptions of garden shrubs; this somewhat alters the scope of the original work, though increasing its interest and general usefulness. They have not greatly modified the text relating to trees, which remains practically as Johns wrote it, but occasional notes are intercalated which help to bring it up to date.

The numerous illustrations will no doubt add to the popularity of the volume, but truth compels us to say that they are not among the best of their kind. The coloured ones are often crude and by no means characteristic; the subjects of the page process-blocks are in some cases ill-chosen, and some—*e. g.* the Chili Pine—seem to have no connection with the text and are not, so far as we have seen or as the index informs us, mentioned in the book. This, by the way, is also the case with some of the coloured plates—e. g. *Libocedrus decurrens*, which faces an account of the Willows and does not appear in the text. The "text illustrations" are a scratch lot, derived from various sources, but all old friends. The book is nicely printed and handsomely bound, and would form a suitable school prize.

One point calls for criticism: neither the title-page nor the preface is dated. The title on the title-page differs from that on the cover, and neither corresponds with that on the first page of the text!

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on December 7th Mr. H. N. Dixon gave an abstract of his paper on New Zealand Mosses. He stated that several collectors had contributed to this account, and specially referred to the mosses sent by Mr. W. Gray from Mauriceville, Wairapa, North Island, which included a new genus—*Tetraphidopsis* Broth. & Dixon. Dr. George Henderson showed three variations in the foliage of *Alnus glutinosa* from the banks of the River Darenth, corresponding with varying dates of leafing, leaf-fall, and fruiting. Dr. Scott, the President, spoke on the changes induced by trees and shrubs being cut back, the luxuriance of the new growth making them almost unrecognisable, as in a case observed at Oakley, when it was found that *Rhamnus cathartica* had assumed a new form owing to severe coppicing.

A Bulletin (No. 328) containing notes on plant diseases has been issued recently by F. C. Stewart, under the auspices of the New York Agricultural Station. The author makes a general survey of the diseases and malformations of the higher plants which have come under observation in the New York State during the last ten years. Most of these diseases are due to fungi; but troubles caused by insects and by unfavourable weather conditions are also dealt with. A fine series of photographs illustrates the more important cases.

Mr. Hiern has published in the Transactions of the Devonshire Association for the Advancement of Science what is evidently a careful and exhaustive account of the distribution of *Rubus* in Devon. "For the classifiation of the species, other than fossil," he tells us he has "mainly followed the leading German authority, Dr. Wilhelm Olberg Focke, who has in course of publication or preparation his *Species Ruborum*; the first part of this monograph appeared in 1910." The "ample assistance" of the Rev. W. Moyle Rogers is acknowledged. The only fossil species mentioned is *R. microspermus*, C. & E. M. Reid, from Bovey Tracey.

The fourth number of the *Journal of Genetics*, completing the first volume, is mainly occupied by Miss Edith R. Saunders's paper on the inheritance of "doubleness" and other characters in Stocks—a continuation of the observations published in the Reports to the Evolution Committee of the Royal Society. The paper summarizes the results of very numerous observations, many of which are conveniently displayed in tabular form. Messrs. Bateson & Punnett supplement their paper lately published in the Proceedings of the Royal Society so far as this related to their observations on the Sweet Pea.

A new quarterly magazine devoted to Scottish botany is announced to appear in January, as a result of the decision on the part of the *Annals of Scottish Natural History* to abandon its botanical section—it is not stated whether a change of name will, as would seem necessary, accompany the limitation of programme. The new venture will be called *The Scottish Botanical Review*, and will be under the management of an editorial committee, among whose names we do not find that of Prof. Trail, who was so prominently associated with the botany of the *Annals*.

The Lichen Exchange Club Report for 1911 is chiefly occupied by a criticism by the Secretary of Miss A. L. Smith's *British Lichens*. A reviewer of a book on such a specialised study as Lichenology should have a sound knowledge of the subject, but this Mr. Horwood does not appear to possess, judging from certain misstatements, *e. g.*, those concerning the classification adopted (p. 5), and as to *Chroolepus aureus* (p. 5), *Lecidea* and *Lecanora* (p. 5), *Buellia* (p. 7), &c. If Miss Smith had written some of the things imputed to her, she would indeed have needed the "helpful criticism (in view of possible second editions)" offered in this review. But despite the praised "much less Latinized English," "the simplification of the terminology" was apparently not carried far enough to make matters "readily intelligible" to the reviewer. Mr. Horwood wishes to know why "Specimen not seen" figures after descriptions of Dr. Stirton's plants; judging from the controversy which took place between the Rev. J. M. Crombie and Dr. Stirton some years ago, it would seem that the question should be addressed to Dr. Stirton. The fact that Miss Smith has not adopted the method of double citation is criticized. As has been repeatedly pointed out, the name of an authority is not given to do him honour but to indicate the plant. In the method adopted, e. g., "*Gyalecta cupularis* Schaer. Enum. p. 94 (1850)" the plant is clearly indicated; and the original describer is always cited in the synonymy.

Mr. Horwood's method of spelling proper names has called forth the following protest from the author of the Report proper:—"dear mr. britten in the "report of the lichen exchange club for 1911" which has just appeared i notice that capitals are not used for proper names. without wishing to arouse or enter into any controversy on this yankee innovation, i should like, as the writer of the report, to claim the hospitality of your pages in order to state that the responsibility for this innovation rests upon mr. horwood the secretary, and not upon me. i am still conservative enough to sign my name J. A. Wheldon."

We regret to record the death of Mr. G. R. M. Murray, which occurred on Dec. 16. A notice of him will appear in due course.

A Correction.—We regret that the following corrections relating to the notice of Mr. Bolus (pp. 241–3) were omitted from the list given at the end of our last volume. The date in the heading is given "1910" instead of 1911, and the place and date of his death—Oxted, Surrey, 25 May—are omitted from the notice. The amount bequeathed—"£48,000"—should read £20,000, £28,000 being the amount previously given as the endowment for the herbarium of the South African College.

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By G. S. Boulger, F.L.S.

(Concluded from p. 9.)

A third year in India was substituted for the visit to Borneo, the Government making a grant of £400 a year towards the expenses, which was afterwards extended for three years after Hooker's return, to enable him to work up his collections. In none of his subsequent work is the completeness of Hooker's scientific equipment as a traveller so manifest as in the outcome of his Indian journey. Not only did his botanical knowledge enable him to take full advantage of his opportunities for observation in practically unexplored regions, whilst his literary gift produced an eminently readable narrative and his artistic skill furnished it with graphic illustrations; but he constructed a valuable map of the country traversed, made detailed meteorological and geological observations, besides many interesting ethnological notes, and drew up a complete account of the physical geography of Sikkim and Eastern Nipal. He was practically the first explorer of the Eastern Himalaya since Turner's embassy to Tibet in 1789, and spent two years in Sikkim. Although he received every assistance in their power from Mr. Brian Hodgson, who had been for many years Resident at the Court of Nipal, and from Dr. Campbell, of the Darjeeling Sanatorium, the scientific work of this expedition was most emphatically his own. It was in fact the personal animosity of a faction of the Sikkim Court against Dr. Campbell that led to the violent detention of Hooker and the doctor at Chumanako in November and December, 1849, which very nearly ended in one of those assassinations of travellers which have so often resulted from the most trivial misunderstandings in semi-savage countries.

Returning to Darjeeling, Hooker spent 1850 in the Khasia Mountains and Sylhet, botanizing with Dr. Thomas Thomson, who had been a pupil of his father's at Glasgow. The result was a joint collection of about eight thousand species, the duplicates of which were afterwards distributed from Kew. They left India in January, 1851, and for the next four years Hooker was mainly engaged in working out the results of this journey in conjunction with Thomson, and in completing those of the Antarctic voyage. A paper on the temperature of the soil in Egypt appears in the 1848 *Report of the British Association*, Hooker's long connection with that body dating from a striking account of the diatomaceous vegetation of the Antarctic in the *Report* of the year before. The Bengal branch of the Royal Asiatic Society published his meteorological work: his first contribution to the *Journal of the Royal Geographical Society* was a paper on the passes into Tibet, published in 1851; whilst the Horticultural Society's *Journal* for the following year contained two contributions by him—one on the botany of an excursion made in 1848 from Darjeeling to Tonglo, and the other on the climate and vegetation of Nipal and Sikkim. We have already alluded to the publication of a preliminary sketch, as it were, of his journals in his father's *Journal of Botany*, during his absence; and in 1849–51 the sumptuous *Rhododendrons of the Sikkim Himalaya* was issued in parts, under Sir William's editorship, with thirty coloured plates, elaborated by Walter Fitch from Hooker's sketches, illustrative of the many fine species of that genus which he introduced. In 1854 appeared the *Himalayan Journals* in two volumes, a somewhat condensed edition following a year later. So great is the number of semi-scientific, semi-popular books of travel of late years that the interest in any one of them is apt to be short-lived. It is, therefore, no slight testimony to the permanent value of this work of Hooker's that a cheap popular edition should have been called for in 1891. At the same time, if only for its appendices, it is a work that the scientific student of geographical distribution cannot afford to overlook. It appeared, however, that the systematist was to see the botanical results of the journey when, in 1855, the first volume of the *Flora Indica* by Hooker and Thomson made its appearance. The first half of this volume is occupied by an admirable essay, which, from internal evidence, we should judge to be mainly the work of Hooker, on the history of botany in India and the relationships of the Indian flora. In this, as in the *Introductory Essay to the Flora of New Zealand*, which had appeared two years before, Hooker, whilst still professing his adherence—mainly for the convenience of systematic treatment—to the hypothesis of the permanence or fixity of species, gives almost unqualified submission to the methods of Edward Forbes in explaining plant-migration by extensive recent changes in the distribution of land and water. This gave rise to the vigorous though friendly protests of Darwin, which form part of many of his letters both to Hooker and Lyell. The second half of the volume only carries the description of species, which are in Latin, down to *Fumariaceæ*, averaging about two species to a page. The plan of the work was too extensive and it was abandoned, to be replaced by another more feasible at a later date. As contained in the odd volume of an unfinished work, the valuable introductory essay is in some danger of being overlooked; but visitors to the Herbarium or the Museum at Kew can hardly fail to have their attention arrested by the excellent physical map of India—the work of the authors—taken from this work.

Hooker had been elected a Fellow of the Royal Society on the merits of the *Flora Antarctica* in 1847; and, when this had been followed by most of the *Floræ Novæ Zelandicæ* and much of the preliminary publication of his Indian results, he was, in 1854, awarded the Royal Medal of the Society. In the same year his paper on the rostellum of *Listera ovata* appeared in the *Philosophical Transactions*. The year 1855 was, however, even more momentous in his career. Not only did it witness the completion of the *New Zealand Flora*, the publication of the one volume of

Flora Indica, of the joint paper with Binney on *Trigonocarpon* in the *Philosophical Transactions*, of several palæobotanical papers in the *Journal of the Geological Society*, and of the *Illustrations of Himalayan Plants*, the letterpress of which was his work; but it was in this year also that he communicated to the Linnean Society his first paper on the *Balanophoraceæ*, and that he was appointed Assistant Director at Kew.

The extent of his achievements in systematic and geographical botany is apt to cause Hooker's contributions to special anatomy to be overlooked. As early as 1845 he had written an account of the remarkable group *Balanophoraceæ* for Lindley's *Vegetable Kingdom*, and a third paper on them appeared in the *Linnean Transactions* for 1859; but the most important memoir upon them is that published in vol. xxii. in 1856, which is illustrated by sixteen fine coloured plates by Fitch. It is an able grappling with a difficult problem.

This is neither the occasion nor the pen for a history of the Royal Gardens, Kew, and the scientific institutions connected with them. We suspect that few persons who have not had personal experience of the working of some very closely similar congeries of institutions can form any adequate notion of the magnitude of the task of their administration. Sir William Hooker having reached the age of seventy, much of the burden devolved naturally upon his Assistant Director; and though, as we have said, the son had not the task of initiation which had fallen to his father's lot fifteen years before, the work of such a post necessarily expands progressively. The Gardens were not yet provided with a suitable series of houses, nor was the first museum-building designed for that purpose—now divided between four buildings—completed, when Sir Joseph Hooker became Assistant Director. The correspondence was little more than that of an energetic private botanist, whilst the herbarium was still the private property of the Director; and the relations between the Gardens and such colonial institutions as then existed were of an informal or undefined character. A man of less bodily and mental vigour than Hooker might well have allowed himself to be monopolized by his administrative duties; and, prodigious as his scientific output continued to be, there is, as might be supposed, some decrease due to the cares of office.

The scheme of the *Flora Indica* was not yet abandoned, and from 1857 to 1861 Hooker and Thomson published a series of *Præcursores ad Floram Indicam* in the *Journal of the Linnean Society*. It was in the *Transactions* of the same Society in 1859 that the paper on the pitchers of *Nepenthes* appeared, which was to be followed, fourteen years later, by a description of the whole genus in the *Prodromus*.

On the memorable July 1st, 1858, Lyell and Hooker communicated to the Linnean Society the papers of Darwin and Wallace, in which the hypothesis of Natural Selection was first publicly propounded. Though often impetuous in speech and action, Hooker was eminently cautious intellectually, and was not as easy to convert as his junior, Huxley ; but in November, 1859, the magnificent *Introductory Essay to the Flora Tasmaniæ* definitely announced his belief in the mutability of species, the first fifth of that work being devoted to the species question, the remainder to the geographical problems as to the origin and migration of the Australian flora. This confession of faith was, of course, at once welcomed as a great accession of strength by the Darwinians, although, perhaps, the general public were hardly aware of Hooker's adhesion to the new school of thought until the delivery of his Presidential Address to the British Association at Norwich in 1868.

The six fine volumes of the *Botany of the Antarctic* being completed, Hooker, in 1860, accompanied Captain Washington, Hydrographer to the Royal Navy, and Mr. Daniel Hanbury on a brief holiday visit to Syria, with the special object of examining the Cedars of Lebanon in their native habitat. This trip resulted in papers on the Cedars and on the Oaks of Palestine, published in 1862, and in Hooker's contributing an article on the Botany of Syria to Smith's *Dictionary of the Bible* in 1863, an article which is, perhaps, somewhat disappointing since the identification of the plants mentioned in the Bible is not attempted.

Meantime, the discovery made by Welwitsch in the desert of Angola was to associate Hooker with the third botanical marvel of the nineteenth century, as Brown had been associated with *Rafflesia* and Lindley with *Victoria regia.* The remarkable survival of an early gymnospermous type which its discoverer named *Tumboa*, but which is better known by Hooker's name, *Welwitschia*, gave rise to several preliminary notices from his pen, culminating in the paper published in the Linnean *Transactions* for 1863, with fourteen plates, a paper which for thoroughness of anatomical analysis ranks with those on *Myzodendron*, the *Balanophoraceæ*, and *Nepenthes*.

The wide sweep of Hooker's studies in phytogeography is well exemplified by the year 1862, which saw not only the publication of the already mentioned papers on Palestine trees, but also of his important *Outline of the Distribution of Arctic Plants*, read in 1860, in the *Transactions*, and of the equally important paper on Gustav Mann's collection of plants from the upper half of Clarence Peak, Fernando Po, read in 1861, in the *Journal*, of the Linnean Society ; and, moreover, the beginning of the *Genera Plantarum.* The memoir on the Arctic flora is important not merely as "the first general tabulation of the plants found growing within the Arctic Circle," but more particularly for the way in which this "Scandinavian" flora is traced into all latitudes and its spread is accounted for. So too the value of the Clarence Peak paper in phytogeography is its demonstration of the close affinity between this West African mountain flora and that of the highlands of Abyssinia, the first indication of that unexpected community in character of the plants of Eastern and Western Tropical Africa which has so important a bearing on the question of plant-migration from south to north.

Every botanist must know the value of the service rendered to the science by the more than twenty years of assiduous labour that gave us the *Genera Plantarum*, though what the labour of determining by personal examination the position and limits of every genus of flowering plants amounted to is not, perhaps, always realized. George Bentham, seventeen years Hooker's senior, had already written the *Botany of H.M.S. 'Sulphur,'* his great memoirs on the *Labiatæ* and on the Indian *Scrophularineæ*, and his *Handbook of the British Flora.* He had, as we have seen, completed the *Flora Nigritiana*, on Hooker's going to India; and he had just finished the *Flora of Hongkong.* In the course of these works he had been impressed, as also had Hooker, with the need of a revision of the genera of Phanerogamia which should, with the authority of a competent personal scrutiny, replace Endlicher's work. The joint work being agreed upon, a plan for the division of the labour was also arranged; but Hooker's official duties prevented him from doing as much as was originally intended. After the completion of the great task Bentham fortunately published a brief but explicit statement of the share that each of them ultimately had in its performance, which may be summed up as amounting to about two-thirds to Bentham and the remainder to Hooker, although there was complete accord and mutual responsibility throughout. Bentham's regular daily attendance at the Kew Herbarium, and the daily intercourse with Hooker, naturally developed into a close personal friendship, Bentham, for instance, having his own latch-key to Hooker's house.

Bentham's *Flora of Hongkong* suggested to Sir William Hooker the official preparation, at Government expense, of a uniform series of colonial Floras, with English descriptions, modelled on this work. Grisebach's *West Indian Flora* (1859-64) and Harvey and Sonder's *Flora Capensis* (1859–65) formed part of the proposed series. Bentham undertook the *Flora Australiensis*, the seven volumes of which he completed, with the help of the materials collected by Baron Ferdinand von Müller, between 1863 and 1878; and Hooker, the *Handbook of the New Zealand Flora*, which he published between 1864 and 1867. He had not himself collected at all extensively in New Zealand, which is presumably the point of Darwin's comment, "Oh, my heavens! to get up at second-hand a New Zealand Flora, that is work!" * but the magnitude of his contribution of original description to the work may be gauged by Mr. Hemsley's calculation that sixteen endemic genera and more than half the species described "have the affix *Hook. f.*"

On the death of his father, Hooker became, in 1865, Director, and it was not till ten years later that the Assistant Directorship was revived. Possibly the change in rank did not involve a very great real increase in work; but those who were in a position to observe the allotment of his time at a somewhat later period will know that the merely routine duties of official correspondence and interviews occupied almost the whole of the forenoon of every day and were only too apt to interrupt any other occupation at other times. A dangerous attack of rheumatic fever, incurred while nursing his father in his last illness, resulted in the apparently complete suspension of work during 1865; but the acquisition of Lindley's Orchid Herbarium at this time, and the purchase by the Government, in 1867, of Sir William Hooker's magnificent collections of plants, books, and manuscripts, makes this a fitting place in our narrative to allude to the great assistance that both Sir William and Sir Joseph Hooker derived from their subordinates, and from voluntary assistants. Perhaps, like the Tudor sovereigns, they evinced no small part of their genius in the choice of these helpers. The Gardens at Kew owed much to the botanical enthusiasm of curators like the elder John Smith, who preserved them from destruction in 1840, and, at a later period, George Nicholson. Professor J. S. Henslow had been almost a joint founder of the Museum of Economic Botany with Sir William Hooker; whilst by engaging such assistants as J. E. Planchon, Dr. Oliver, and Mr. J. G. Baker, the founder of the Hookerian Herbarium made it fit to become, as national property, a suitable centre for the organized scientific botanical work of the Empire. Not only did Dr. Oliver undertake the editing of the *Flora of Tropical Africa*, but under his headship the responsibility for the Herbarium was largely taken from the shoulders of the Director; whilst Mr. Baker's unrivalled critical acumen not only ably completed Sir William Hooker's pteridological undertakings, but also made him a court of appeal on such groups of British plants as Roses, Brambles, and Mints, and gave to Kew some of the importance in British botany which it already possessed with reference to the plants of the rest of the world. The presence of such men and of such unofficial workers as Bentham and Reichenbach helped to make Kew Herbarium the Mecca of foreign botanists.

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* *Life and Letters*, ii. 84.

On his father's death Hooker took over the editorship of the *Botanical Magazine*, which he carried on from the 91st to the 130th volume, with the assistance of Mr. Hemsley in the last two volumes, those for 1903 and 1904. This is, as botanists are aware, not a magazine in the ordinary sense of the term, but merely a series of plates of new or interesting plants with brief descriptive letterpress. Its monthly preparation would not, therefore, by itself, prove a very onerous undertaking for its editor, helped as he was by a competent Herbarium staff. An interesting history of the magazine by Mr. Hemsley, revised from that in the *Gardeners' Chronicle* for 1887, was issued in a General Index volume in 1906.

It was, perhaps, more at the annual gatherings of the British Association than elsewhere that Hooker succeeded in reaching the general public. His address on Insular Floras at the Nottingham meeting in 1866, published in the *Gardeners' Chronicle* in the following year; his Presidential Address, on the Origin of Species, at Norwich in 1868; the address on Carnivorous Plants, at the otherwise sensational meeting at Belfast in 1874;

and that on Geographical Distribution at the Centenary meeting at York in 1881, were occasions of this kind, and each of these addresses may be said to have been in their various departments important contributions to the argument for evolution. Ever since their study of the Galapagos plants in the first days of their friendship, the floras of oceanic islands had been a constant subject for discussion between Hooker and Darwin, so that it is difficult to say to which of them the use of these plants as the basis of arguments in the *Origin of Species* originally belonged; but, until supplemented by Mr. Hemsley's essay in the 'Challenger' Reports, and by Wallace's *Island Life*, this address was the only important compendium of our knowledge of the subject. A paper on "The Struggle for Existence among Plants," in the *Popular Science Review* for 1867, also undoubtedly did much to clinch the Darwinian argument; and Darwin emphatically testified his sense of the value of Hooker's outspoken support at Norwich.

From 1867 to 1889 Hooker edited the third series of the *Icones Plantarum*, which his father had established, and most of the analytical details in the drawings illustrating his own contributions are from his own hand. These consist chiefly of species from St. Helena in the eleventh volume of the series. Another man might have made his official duties an excuse for abstention from original scientific work; but Hooker's perfect greed for work, and that of a laborious character, is seen not only in the editing, at the express request of his dead friend, of Harvey's *Genera of South African Plants*, but also in his performing the same office for the fourth volume of Boott's *Illustrations of the Genus Carex*, in 1867.

An even more laborious undertaking was *The Students' Flora of the British Islands*, first issued in 1870. The Flora originally published by Sir William Hooker in 1830, the sixth, seventh and eighth editions of which were the joint work of Dr. G. A. W. Arnott, had for many years been a popular guide to British field-botanists. From its first publication in 1843 Babington's *Manual* had given a new direction to the study of our wild plants; whilst Bentham said somewhat contemptuously of his own *Handbook*, first issued in 1858, that he "wrote it for ladies." Babington's method of treating almost all named forms of plants in only two categories, *i.e.*, as species or varieties, certainly failed to suggest those gradations of relationship recognised by the theory of descent; whilst Bentham's method of ignoring the difficult groups was neither scientific nor educational. Hooker had not the repute of having devoted much attention to British species in the herbarium, still less in the field. He, however, drew up most of the ordinal, generic, and specific characters "from living or dried specimens or both," and then consulted *English Botany* and other British and Continental Floras. From the systematic point of view the most original feature of the work is the elaborate gradation of tribes, sections, sub-species, varieties, and forms into which he subdivides his orders, genera, and species, thus combining most of the minute study of the "splitter" with the expression of the evolutionary views of a "lumper." For assistance in treating the genera *Rubus*, *Rosa*, and *Hieracium* he had recourse to Mr. J. G. Baker. Still more novel, however, was the incorporation in such a pocketable volume of indications of British altitudinal and comital distribution, taken from Watson's *Cybele*, and of extra-British distribution from Nyman's *Sylloge*. The result was a marvel of compressed information that secured an immediate success for the work. In the preface to the first edition he expressed a wish for a companion volume dealing with the physiological peculiarities of the various species; but in the third edition, in 1884, for which he acknowledges help from Mr. Baker, Mr. Nicholson, Mr. John Ball, and Mr. Arthur Bennett, he to a considerable extent supplied such information by the addition of such single words as "anemophilous," "homogamous," or "proterandrous."

Hooker had long wished to compare the flora of the Atlas with what he had seen years before of those of Madeira and the Canaries, and with his herbarium knowledge of Fernando Po and Abyssinia. In April, 1871, having secured permits from the Sultan of Morocco through the Foreign Office, he started with his friend, John Ball, the distinguished Alpinist, who had also an excellent critical knowledge of plants, George Maw (a skilled geologist), and a young gardener from Kew, by way of Southampton and Gibraltar to Tangier, Tetuan, Ceuta and Mogador, and inland to the ridge of the Great Atlas. He was back again in England in June; and, though he had taken full notes during the trip, pressure of official duties, and, at this time, one must add, worries, together with his election in 1873 to the presidential chair of the Royal Society, threw the bulk of the subsequent work upon Ball. He it was who prepared the *Spicilegium Floræ Maroccanæ* for the *Journal of the Linnean Society* of 1877–8, and upon him too devolved most of the preparation of the interesting *Journal of a Tour in Morocco and the Great Atlas*, which appeared in the latter year. The first two chapters are mainly the work of Hooker, together with three valuable appendices dealing with economic plants, and those comparisons of the flora with those of the Canaries and the mountains of Tropical Africa, which were the main object of the journey. Two or three striking sketches of the mountains, in this volume, are from Hooker's pencil.

It is not necessary here to dwell on the friction that occurred in 1871 between Hooker, as Director of Kew, and the notoriously tactless First Commissioner of Works, Mr. Ayrton. Middle-aged playgoers will remember how that statesman furnished one of the main parts in the suppressed burlesque of "The Happy Land." The stupid attempt to disintegrate the whole organization of Kew ended discreditably for the Minister, and evoked widespread expressions of sympathy and admiration for the great botanist.

In 1872 appeared the first volume of the *Flora of British India*, planned on the more modest scale of the Colonial Floras already issued, in place of that of the *Flora Indica* of 1855. This work was completed in 1897 in six volumes, and a copious index.

Some 17,000 species are described in its pages, which number 5668; but, from the first, Hooker was assisted in the description of most of the Natural Orders by a number of other botanists, so that most of his own work was editorial. Even this was more than he could accomplish for the later volumes, the supervision of which fell to Mr. C. B. Clarke, who was already a voluminous contributor. On the completion of this great undertaking, Hooker, who had been made a Knight Commander of the Star of India in his sixtieth year, was made a Grand Commander of the Order. Perhaps his last really remarkable work, except in so far as all the work of a man over fourscore years of age is remarkable, was the little *Sketch of the Flora of British India* that he prepared in 1904 for the new edition of the *Imperial Gazetteer of India*. It only occupies fifty-five octavo pages, but it comprises an admirable taxonomic and statistical *aperçu* of the flora of the vast area involved, with a most suggestive revision of the views as to its origin and distribution which its author had put forward in 1855. The introductory portion of this *Sketch* was reprinted in the *Journal of Botany* for 1904, and was accompanied by a very pleasing photographic portrait of its author.

Another laborious undertaking was brought to a conclusion in 1873 by the publication of Mrs. Hooker's translation of Le Maout and Decaisne's *General System of Botany* under Hooker's editorship. The volume is, perhaps, most often consulted for its beautiful analytical drawings; but the editor added numerous notes on the affinities of the Orders, and gave details of the redistribution of the genera into tribes in advance of the publication of the *Genera Plantarum*, concluding with a chapter on the principles of classification, and a synopsis of the entire vegetable kingdom in Classes, Cohorts, and Orders. In this, the cohorts are of far greater value, as the direct result of the joint labours of Bentham and the writer, than is the division into four classes by which Acrogens and Thallogens are placed in the same grade as Dicotyledones and Monocotyledones. It is not possible here to discuss that further disputable systematic conclusion by the authors of the *Genera*—the creation of the series *Disciflorœ*. Hooker's contributions to his wife's translation have given it a lasting importance in the history of systematic botany.

If, as we have already suggested, the *Primer*, which he contributed to Macmillan's Series in 1876, was in some respects rather an echo of the teaching of a passing period than a step in advance in education, the fault was, perhaps, in part that of the scheme. The space was very restricted: the compilation of a primer or first book is by no means an easy task; and Hooker had no experience as a teacher of children. One of the defects of such works in the "seventies" was their exclusive attention to external anatomy. It might have been hoped that the establishment of the Jodrell Laboratory at Kew, which was opened in the year in which the *Primer* was published, would do much to foster those physiological studies in which the countrymen of Stephen Hales had hitherto been remiss; but it is, perhaps, the absence of adequate equipment or endowment that has prevented the realization of this hope.

Only one continent remained as yet unvisited by Hooker. He may be said to have inherited the friendship of Asa Gray from his father; but until 1877 he had not visited North America. In that year the two friends accompanied Dr. Hayden, the head of the United States Topographical and Geological Survey, to Colorado and Utah. Nearly one thousand species were collected; and the conclusions arrived at were first published in a paper "On the Botany of the Rocky Mountains" in *Nature* for October 25, 1877, which was accompanied by a steel-engraved portrait of Hooker by C. H. Jeens, from a photograph by G. M. Wallich, and by a memoir by Asa Gray. "No living botanist," writes the American professor, "that we know of has shared Sir J. D. Hooker's opportunities of studying in place the living vegetation of so many parts of the world." Alluding to Banks, Asa Gray says also that botanists all over the world "rejoice to see the presidential chair at the Royal Society occupied for the second time by a botanist and explorer. They concede the paramount claims of public duty, yet not without a shade of jealousy and regret; for administration is time-consuming and endless, while Hookers and their like are few." A lecture at the Royal Institution in 1878 *On the Distribution of North American Plants* was published in 1879; and the detailed official report of the journey, Hooker's share in which is one of his most valuable contributions to phytogeography, appeared in 1881 in the sixth volume of the *Bulletin of the United States Geological Survey*. On this journey Hooker, probably the only botanist who has ever studied the three species of *Cedrus*—or forms, as he preferred to consider them—in their native habitats, was able to examine the giant Sequoias and other conifers of equal age; and in 1880 he published a description of the interesting insular variety of Cedar discovered by Sir Samuel Baker in Cyprus.

After his long term of public service Hooker had now well earned his retirement. Kew had been enriched in 1880 by the gallery of pictures presented by Miss North; and, in 1882, by the addition of the charming rock-garden. The actual resignation came in 1885, when Hooker was succeeded by his son-in-law Mr. (now Sir William) Thiselton Dyer; but though he left Kew for the less accessible Sunningdale, which led ultimately to his giving up the editorship of the *Botanical Magazine*, he by no means abandoned botany, and was constantly at the scene of his many years' labours.

It is, perhaps, to be regretted that in these later years, when he had already reached the full span of years traditionally allotted to mankind, distrust of his own power of sustained work deterred him from undertaking some substantive work on phytogeography. In lieu of this he undertook from time to time a stupendous series of editorial tasks. In 1887, 1892 and 1900 he revised the fifth, sixth and seventh editions of Bentham's *Handbook of the British Flora*, and, by judicious omission of book-names and addition of forms previously passed over, considerably improved it. His association with the *Index Kewensis*, under the bequest of his friend Darwin, although it has been repeatedly misrepresented and exaggerated in the public Press, was no mere sinecure. The work was emphatically Dr. Jackson's; but Hooker read the proofs and added geographical references. An even more remarkable undertaking was the completion of Trimen's *Handbook of the Flora of Ceylon*—a botanist dying at the age of fifty-two, leaving only three-fifths of his work completed, his task is taken over by another botanist of eighty and satisfactorily concluded by him at eighty-three! Hooker had not only to edit Trimen's materials but also entirely prepared the account of the *Gramineæ* in the fifth and final volume issued in 1900.

Interested in Banks "as the pioneer of those naturalist voyagers of later years, of whom Darwin is the great example," Hooker, in 1893–6, had a transcript made of the copy of Banks's journal during his voyage with Cook which is in the Botanical Department of the British Museum. This he edited and published in the latter year.

No attempt has been made here to exhaust the list of Hooker's papers, and, perhaps, some bibliographer blessed with leisure will tell us how many genera and species he described in the course of his long botanical career, from *Polytrichum semilamellatum* in 1840 to *Impatiens notoptera* in 1911. The genus to which the last-named species belongs was the occupation of the last months of his life, and, in the interesting detailed bibliographical account which he has recently contributed to the *Gardeners' Chronicle*, Mr. Hemsley states that no fewer than one hundred and fifty species bear the affix "*Hook. f.*"

As the object of the present sketch has been mainly a briefly critical appreciation of his botanical work, it is needless to attempt to enumerate the many honours by which academies and universities honoured themselves in honouring Hooker; the honorary Doctorates of Oxford, Cambridge, Glasgow, and elsewhere; the Copley and Darwin Medals of the Royal Society; the special medal struck by the Linnean Society in 1897 and the Darwin-Wallace Medal of 1908; and, finally, the Order of Merit in his ninetieth year.

The heat of last summer told on the long vigorous constitution, and Hooker died, at Sunningdale, after a very brief illness, on December 10th. He was buried in the churchyard at Kew, near his father and grandfather, in the presence of a large gathering of British men of science.

Hooker was twice married, first to Frances Harriet, daughter of Professor J. S. Henslow, and secondly to Hyacinthe, daughter of the Rev. W. Symonds of Pendock and widow of Sir William Jardine.

It may be well to place on record that in addition to the fine portrait by Sir Hubert Herkomer at the Linnean Society, Hooker also appears among the Brethren of the Charterhouse in the well-known picture by the same artist, now at the Tate Gallery.

NEW OR NOTEWORTHY FUNGI.—PART IV.

By W. B. Grove, M.A.

(Plates 515, 516.)

(Concluded from p. 18.)

165. Trichosporium chartaceum Sacc. Syll. Fung. iv. 294.

Forming scattered, orbicular, black spots, 1–2 mm. diam. Hyphæ vaguely branched, 4 μ diam.; conidia numerous, pulverulent, brown or dark olive-brown, globose or elliptic, rather rough, 4–6 × 4 μ.

On damp brown paper, Birmingham, May. This differs from the type only in the fact that the spores are not smooth, but roughened and slightly angular, probably because they are more mature. The fact that spores which are ultimately rough are often quite smooth in their earlier stages has been the cause of many mistakes.

166. Scolecotrichum graminis Fckl. Sacc. Syll. Fung. iv. 348.

Tufts of conidiophores dense, black, spot-like, seated in long rows on elongated, arid, ochraceous spots. Hyphæ erect, continuous, simple, nodulose, 100 × 6 μ, of a dusky but clear olive-brown colour. Conidia of the same colour, obclavate, uniseptate, averaging 40 × 9 μ. (Tab. 516, fig. 5.)

On the under surface of living leaves of *Phleum pratense*, Marston Green (Wk.), July. This might be considered identical with *S. sticticum* B., except that it is seated on conspicuous ochraceous spots, and appears to be decidedly parasitic.

69. Diplococcium spicatum Grove, Journ. Bot. (1885), p. 167, t. 257, f. 7; Sacc. Syll. Fung. iv. 374.

This very rare fungus I have since found at Studley Castle, in addition to the original locality at Sutton. The new specimens revealed to me that (owing to a mistake in noting the magnifying power used) I had given the size of the conidia (*loc. cit.*) at half their proper magnitude; they should be "20 × 10 μ." They are at first obovate, not constricted, and pellucid but with a very dark septum, afterwards assuming the mature form.

167. Helminthosporium inconspicuum C. et E. Sacc. Syll. Fung. iv. 411.

Hyphæ 250–300 × 10–11 μ, 6–8-septate, somewhat dark, paler at the apex, where they are flexuous and nodulose. Conidia oblong-lanceolate or nearly cylindrical, rounded at the ends, up to 120 μ long, 15–16 μ thick, 5-septate, at length 8–9-septate, wall always nearly diaphanous, pale olivaceous brown. (Tab. 516, fig. 4.)

On fading grass-leaves, Longdon Green, Lichfield (St.), September. I have already recorded (Journ. Bot. 1885, p. 168) a variety of this species; the specimens now described seem to be nearly of the type, at any rate as figured by Peck (34th Report p. 51, t. iii. f. 4–6). The chief mark of the species lies in the pale diaphanous epispore, for which reason it is quite inconspicuous and cannot be seen except by microscopical examination.

168. HETEROSPORIUM GRACILE Sacc. Syll. Fung. iv. 480.

Hyphæ in little clusters which are often slightly circinating or scattered over oblong or elliptical dry patches of the leaf; spots pale, surrounded by a distinct fuscous-purple border. Hyphæ erect, rather flexuose, septate, nodulose upwards, olive, 40–150 × 9–10 μ, having at the base a little knot of a few dark cells. Conidia oblong, 1–3- (or even 4-) septate, constricted at the septa, 30–45 × 16–18 μ; cells cubical or rounded, at first pale and smooth, then dark olive and distinctly muriculate. (Tab. 516, fig. 6.)

On leaves of *Iris germanica*, Studley Castle, October.

169. SPEIRA COHÆRENS Preuss, Sacc. Syll. Fung. iv. 515.

Conidia erect, collected into little clusters which are thickly scattered or even arranged in lines, olivaceous-green in mass, singly pellucid olive, 25–40 × 20 μ, oblong-obovate, not always plane but often consisting of two layers in the centre, composed of 4–6 series of joints. Joints subquadrate, translucent, 4–5 μ diam., many with a large oily nucleus.

On bark, Maxstoke Priory (Wk.), August. This seems to be the species of Preuss, but I would rather consider it a translucent variety of *S. toruloides*, possibly a young state.

170. SPEIRA EFFUSA (Peck) Sacc. Syll. Fung. iv. 514.

Conidia 20–30 μ wide, effused in a blackish brown velvety stratum, resembling those of *Speria toruloides*, but the separate joints are only 5–6 μ wide.

On dead wood, Studley Castle, March. This also I consider to be a mere variety of *S. toruloides* Corda. They should be arranged thus:—

S. toruloides Corda.
  var. *effusa* Peck.
  var. *translucens* m. = *S. cohærens* Preuss.

The breadth of the joints of *S. toruloides* given by Saccardo (*l. c.* p. 514), *viz.* 8–9 μ, is certainly greater than the usual state.

171. **Septosporium elatius** *m.* Effusum, atrum, velutinum; hyphis biformibus, sterilibus filiformibus, brunneo-atris, opacis, flexuosis, basi subincrassatis, superne interdum subpellucidis, multiseptatis, ad septa vix constrictis, 500–1000 × 18–20 μ; fertilibus (h. e. conidiorum pedicellis) brevibus, olivaceis, 6–8 μ cr., pellucidis, 4–5-septatis, apice in conidia clavata abeuntibus; conidiis 20–25 μ lat., olivaceis, vix obscurioribus, 2–5-septatis, cum pedicello 80–130 μ long., subinde curvatis, septo longitudinali rarissimo. (Tab. 516, fig. 7.)

In cortice, Aberystwyth, Jan. *Macrosporium nigrellum* C. et E. peraffine videtur, conidiorum insertione neglecta.

172. ALTERNARIA TENUIS Nees, Sacc. Syll. Fung. iv. 545; Fung. Ital. t. 737.

Forming a very thin layer; hyphæ very short, erect, septate, pale in colour; conidia in branched chains, lageniform, olivaceous, 3–5-septate, with a few longitudinal septa, 25–35 × 12–14 μ. (Tab. 516, fig. 8.)

On various leaves and stems, Edgbaston, Studley, &c. Barely perceptible to the naked eye. The conidia are formed in a basifugal manner, the youngest at the apex.

173. GRAPHIUM PASSERINII Sacc. Syll. Fung. iv. 613.

Stems erect, black, shining, hair-like, subulate, smooth, 1–1½ mm. high, formed of numerous slender compacted brown septate hyphæ, all parallel and gradually thinning out at the top, not markedly free at the tips. Head of conidia grey, oblong-cylindrical, forming about ⅓–½ of the height of the whole. Conidia hyaline, 5 × 2½ μ, ovate-oblong, but somewhat acute at one end, very numerous and apparently involved in mucus.

On dried twigs of Bramble, Hunnington (Ws.), June.

174. STYSANUS MANDLII Mont. Ann. Sci. Nat. (1845), p. 365, t. 14, f. 2; Sacc. Syll. Fung. iv. 623.

Gregarious; stems 1–1¼ mm. high, 20–25 μ thick, nearly black, fibrous, slender and straight; head elongate-cylindrical, sometimes forked, greyish brown. Conidia in short chains, ovate or ellipsoid, 3½–5 × 2–2½ μ, pale brownish, diaphanous.

On twigs of Gooseberry, Studley Castle, April. I should have put it down as a *Pachnocybe*, if I had not seen the spores in chains. It differs from the type in having paler spores.

175. STYSANUS CYBOSPORUS D. Sacc. Staz. Sper. Ital. xxxi. p. 80.

Coremia at first tubercularioid, afterwards stilboid, gregarious, olive-coloured; when young wart-like, 1 mm. broad, ½ mm. high, composed of a dense mass of branched septate olive hyphæ, bearing a few conidia at their summits; when older, taller and looser, like a *Stysanus*, 1–1½ mm. high, paler upwards, and nearly as broad as the height. Hyphæ of stalk compact and parallel, not very closely septate, olive, 5 μ diam., repeatedly branched upwards; branches paler, composed of cuboid joints which at length separate from one another except for a narrow central isthmus, and become rounded spores, 6 μ diam. The spores are very pale olive, but clear, and retain for a long time traces of their mode of origin, being square-shouldered, and minutely apiculate on two opposite sides.

Abundant on dead herbaceous stems, Cannon Hill Park, Birmingham, July to November.

176. **Sphacelia Curreyana** *m.* Hyphis dense intertextis, albis, 2–2½ μ diam.; sporophoris ramosis, ramis primo solitariis, dein oppositis, denique verticillatis, irregularibus; conidiis globosis, 3–5 μ, in apicibus ramorum, ut videtur, solitariis.

In sclerotiis *Sclerotiniæ Curreyanæ*, in *Junco*, Sutton Park (Wk.). The sclerotia were of a delicate pink inside, and during the previous year the same tufts of rushes had produced a plentiful crop of the *Sclerotinia*.

177. HYMENULA CALLORIOIDES Sacc. Syll. Fung. iv. 669. Var. CORTICIS *m.*

Sporodochiis sparsis gregariisve, ½ mm. latis, lentiformibus,

succineis v. albidis, gelatinosis; sporophoris prælongis, usque ad 200 μ, dense fasciculatis, bacillaribus, 1 μ cr., simplicibus, septatis; conidiis numerosissimis, cylindraceis, rectis v. subinde curvulis, 9–10 × 1½ μ, hyalinis, coacervatis hyalino-succineis. (Tab. 516, fig. 9.)

In cortice, Studley Castle, April. Sporophora et apice et a latere ad septa conidia gignunt.

178. LACHNEA COPRINARIA Phill. Discom. p. 224; Mass. Fung. Fl. iv. 310. Var. MINIMA *m.*

Ascophoris ¾–1 mm. diam., gregariis, sessilibus, hemisphæricis, coccineis; margine elevato, piloso. Pilis brunneis, 300–450 × 12–20 μ, crasse tunicatis, superne attenuatis, rigidis, erectis, septatis. Ascis cylindraceis, 200 × 20 μ, apice truncatis, basi subattenuatis; sporidiis oblique monostichis, ellipticis, levibus, hyalinis, continuis, utrinque obtusis, eguttulatis, 22–25 × 11–12 μ; paraphysibus superne subincrassatis, granulis rubris repletis.

On rabbits' dung, Sutton Park, May. At first sight closely resembling *Ascophanus pilosus.* Outer cells of cortex very large, hyaline, 40–50 μ diam. Marginal hairs in two or three rows, very similar to those of *L. stercorea*, but without the stellate hairs of that species, though mixed below with shorter subhyaline hairs, as in *L. coprinaria*, which, however, is ½–1 cm. across. Possibly this variety owes its smaller dimensions to its habitat.

179. **Chætomium chlorinum** *m.* *Ch. Fieberi* var. *chlorina* Sacc. Mich. i. 27; Syll. Fung. i. 223.

Perithecia black, gregarious, subovate, arranged more or less in rows, completely hidden by a mass of very long pili, which are simple (rarely branched), septate, roughish, slender and flexuous, at first yellowish, then yellowish green, at length olive-brownish and (under the microscope) fuscous, paler upwards, 4 μ diam. Asci clavate, longly stipitate, soon diffluent; sporidia eight, distichous and at last conglobate at summit of ascus, at first colourless, then greenish yellow, at length smoky-olive, lemon-shaped, uniguttulate, and slightly unequal-sided, 15 × 10 μ when mature. Paraphyses numerous, very delicate, filiform, longer than the asci. Asci 50–55 × 16–20 (part. sporif.), stipes 40–50 μ long; paraphyses 2½–3 μ diam. and about 100–130 μ long.

On rotting stems of Jerusalem Artichoke and similar stems, Sutton Coldfield (Wk.) and Hunnington (Ws.), June, September. *Ch. olivaceum* C. et E. (Grevill. vi. 96) seems to be closely allied, but the sporidia are described as "brunneis."

Ch. chlorinum appears at first as a small tuft of hairs which are seated on a black tubercle; the hairs are blackish at the base, then greenish, at the summit yellow. In this stage they are nearly straight, but later, as the perithecium develops, they become very long and intricately flexuous. Their roughness is due to minute crystals which are easily removed by water.

Var. RUFIPILUM *m.* Peritheciis ½–1 mm. altis, ovatis v. lageniformibus, atris, acutis, vertice junioribus glabratis, alibi pilis simplicibus, tenuibus, leviter flexuosis, 5 μ cr. vestitis; pilis primo

olivaceo-brunneis, dein roseo-rufis, non opacis, asperulis, tenuiter parceque septulatis, superne dilutioribus et angustioribus, senio longissimis, tortuosis, intricate intertextis et perithecia obtegentibus. Asci clavatis, stipitellatis; paraphysibus non visis; sporidiis 8, distichis v. apice conglobatis, limoniiformibus, ex hyalino fuligineis, 15 × 10 μ.

On stems of *Heracleum*, Hunnington (Ws.), in company with *Ch. chlorinum* as well as *Ch. comatum.* Distinguished from every other form of *Chætomium* by its distinctly rufous hairs.

180. Sordaria lignicola Fckl. Sacc. Syll. Fung. i. 236.

Perithecia half immersed in soft rotten wood, globose, ending in a thick rough truncate neck, about as long as the perithecium is wide. Asci fusiform, 150 × 14 μ; sporidia immature, cylindrical, curved, hyaline, multiguttulate, 50 × 4, provided at each end with a short hyaline appendage, equal to the breadth of the sporidium in length.

On soft wood, California, Harborne (Ws.), August. There were no mature sporidia, but otherwise the specimens seemed to belong to this species.

181. Rosellinia mastoidea Sacc. Syll. Fung. i. 258.

Perithecia superficial, gregarious, but not or rarely confluent, 1 mm. diam., globose, smooth, glabrous, with a short and beautiful little papillate ostiolum; asci cylindrical, 100 × 10 μ; sporidia eight, monostichous, oblong-ovoid, obtuse at the ends, 20 × 8 μ, without any appendages, dusky brown, somewhat flattened and therefore thinner in side view than in face view; paraphyses numerous filiform.

On fallen branches, Studley Castle, April. A conspicuous and beautiful species.

182. **Trichosphæria crassipila** *m.* Tenuissime in subiculo atro effusa; peritheciis globosis, astomis, atris, pilis brevibus obductis; pilis atro-viridulis, scabriusculis, semi-pellucidis, 250–300 μ long., basi 20 μ cr., apicibus attenuatis. Ascis cylindricis, 100–120 × 11 μ, paraphysibus numerosis, linearibus obvallatis; sporidiis oblique monostichis, ovali-oblongis, utrinque obtusis, continuis, eguttulatis, subgranulosis, 10–11 × 6 μ, achrois.

In ligno putri, Studley Castle, Nov. Hairs thick-walled below, tapering to a rather thin, narrow point; base of the perithecium furnished with nodulose, septate, brown hyphæ, 3–4 μ thick. The perithecia are greenish black by transmitted light.

183. Wallrothiella minima Sacc. Syll. Fung. i. 455.

Scattered or gregarious; perithecia very minute, black, carbonaceous, ovate-acute, terminating in a sharp minute ostiole. Asci cylindrical, stipitate, 50 × 5 μ (part. sporif.); sporidia obliquely monostichous, oblong, hyaline, 7–8 × 3 μ.

Seated among the fibres of bare wood, King's Norton and Selly Oak (Ws.), December–August.

184. Diaporthe Tulasnei Nits. Sacc. Syll. Fung. i. 657.

Stromata short, oblong, black, slightly raised, with a few perithecia immersed in each. Perithecia globose, with a scarcely prominent ostiole. Asci oblong or subclavate 60 × 6–7 μ; sporidia distichous, fusiform, obtuse at each end, uniseptate, 4-guttulate, not constricted, subhyaline, 14–15 × 3 μ.

On stems of *Urtica dioica*, Studley Castle, May. The matrix is stained deeply with black round each stroma.

185. LEPTOSPHÆRIA RUBICUNDA Rehm, Sacc. Syll. Fung. ii. 25; Fung. Ital. t. 292.

Perithecia gregarious, immersed, then erumpent and nearly free, the matrix tinged round them with a wide crimson stain, brownish black, globose, papillate, then collapsed, 150 μ diam. Asci cylindrical-clavate; sporidia narrowly fusoid, subclavate, 3-septate, yellowish, 20 × 2½ μ.

On stems of *Conium maculatum*, Studley Castle, November.

186. LEPTOSPHÆRIA MICROSCOPICA Karst. Sacc. Syll. Fung. ii. 59.

Perithecia arranged in rows, singly or two together, covered by the raised unchanged epidermis, which is pierced by the minute round ostiole, globular or somewhat depressed, smooth, black, under the microscope subtranslucent, parenchymatous, scarcely or not at all papillate, 100–250 μ diam.; asci with very short pedicels, broadly oblong-clavate, obtuse at apex, 90 × 15 μ; sporidia subtristichous, pale brown, triseptate, occasionally constricted, one or two loculi subinflated, oblong-fusoid, slightly curved, obtuse at each end, 24–28 × 6–7 μ; paraphyses few, slender, linear.

On culms and sheaths of *Dactylis glomerata* and *Phleum pratense*, Studley Castle (Wk.), Selly Oak (Ws.), Baggeridge Colliery (St.), July–December. I have also found, at Packwood (Wk.), a form of this approaching *L. vagans* Karst., distinguished by its slightly larger perithecia and spores, the latter measuring 34–38 × 11 μ.

187. METASPHÆRIA CULMIFIDA Sacc. Syll. Fung. ii. 174.

Perithecia scattered, or two or three together in a row, covered by the epidermis which is unchanged in colour, at length splitting it and erumpent, ellipsoid or roundish, flattened at the base, with a short subconical ostiole, black, glabrous, shining; asci oblong-clavate, fasciculate, very shortly stipitate, 90 × 14; sporidia fusiform, straight when seen from the front, curved when seen sideways, 3-septate, not constricted, eguttulate, pale yellowish, distichous, 25–30 × 6–9 μ.

On culms of *Poa*, Harborne (Wk.), July.

188. **Pleospora thujæ** *m.* Peritheciis sparsis, emergentibus, rotundatis, 150 μ diam., ostiolo minuto perforatis, atris, glabris, nitidis; ascis oblongis, breviter pedicellatis, 70–90 × 20 μ, vertice rotundatis; sporidiis distichis, flavis, oblongo-clavatis, muriformibus, basi attenuatis, 20–25 × 7–9 μ, junioribus inæqualiter uniseptatis, hyalinis, ad septum constrictis (ad instar Sphærellæ), dein 4–5-septatis, loculis 1–3 septo longitudinali divisis, ad septum primarium semper evidentissime constrictis.

In pagina exteriore squamarum coni *Thujæ occidentalis*, socia

Pestalozzia conigena, Studley Castle, Mart. Perithecii contextus parenchymaticus, obscure olivaceus.

189. Eleutherosphæra longispora Grove.

For description and figure see Journ. Bot. (1907) p. 171, t. 485, f. 3.

190. Phyllosticta hedericola D. et M. Sacc. Syll. Fung. iii. 20.

Spots large, roundish or irregular, whitish, surrounded by a broad brown border. Pycnidia epiphyllous, blackish, numerous, gregarious, globose, sometimes rather flattened, epidermis pierced by the short ostiole. Sporules oblong, faintly biguttulate, involved in mucus, 5–7 × 2–2¼ μ.

On ivy-leaves, Studley Castle, May; and Warwick Castle, July, August. Sometimes the margin of each spot is marked by several concentric borders with narrow intermediate bands of whitish brown, like successive waves on a beach.

191. Phyllosticta japonica Thüm. Sacc. Syll. Fung. iii. 25.

Spots large, arid, whitish, distinctly margined with brown, dirty ochraceous below. Pycnidia gregarious, numerous, epiphyllous, minute, punctiform, long covered, then emerging conically. Sporules numerous, ellipsoid, rounded at the ends, with a large guttula, 4–4½ × 2½–3 μ, hyaline.

On fading leaves of *Mahonia japonica*, Studley Castle, May.

192. Phoma grossulariæ S. et S.

Pycnidia gregarious, black, shining, globose-depressed, somewhat collapsed, 0·2–0·3 mm. diam., at first covered by the epidermis, then bursting through by the short obtuse ostiole. Sporules oblong-oval, hyaline, 6 × 4 μ.

On twigs of Gooseberry, Studley Castle, November. The basidia were not seen. Texture of pycnidium olive-brown, parenchymatous. With this were some pycnidia which appeared to be *Dendrophoma pleurospora* Sacc. (Syll. Fung. iii. 178). They were very similar to the others, but had shortly cylindrical sporules, 5 × 1 μ; basidia very conspicuous and branched.

193. Phoma acicola (Lév.) Sacc. Syll. Fung. iii. 100.

Pycnidia single or two together, globose, erumpent, surrounded by the split epidermis, rugulose, black, 250–300 μ diam. Sporules ovate-oblong, 6–9 × 4 μ, hyaline, biguttulate.

On leaves of Scots Pine, Marston Green (Wk.), December.

194. Phoma pinicola Sacc. Syll. Fung. iii. 100.

Pycnidia large, conspicuous, erumpent, black, varying in shape, papillate or obtuse, thick-walled, arranged in rows. Sporules obovate, biguttulate, hyaline, about 10 × 4 μ.

On leaves of *Pinus laricio*, which were still attached to a branch that had been broken off, Studley Castle, October. Bursting through the epidermis in long lines, surrounded by laciniæ.

195. Phoma prunicola (Schw.) Sacc. Syll. Fung. iii.

Pycnidia gregarious, amphigenous, seated mainly in a large irregular cinereous spot which is visible on both sides of the leaf, bursting through the epidermis, which is sometimes torn into laciniæ, black, ovate, opening by a pore which soon becomes very wide and irregular. Sporules oblong-elliptic, obtuse at both ends, usually faintly biguttulate, 9–10 × 3½ μ.

On fallen dry leaves of *Prunus Lauro-cerasus*, Over Whitacre (Wk.), April.

196. **Phoma deusta** Fckl. Sacc. Syll. Fung. iii. 155.

Pycnidia minute, scattered, black, depressed, each surrounded by a mass of brown hyphæ which impart a scorched appearance to the spot; ostiole short; sporules straight, oblong, continuous, with a minute guttula at each end, 6 × 1½, hyaline.

On dry bracts, capsules, and peduncles of *Rhinanthus Crista-galli*, Henley-in-Arden (Wk.), February. The spores were few and imperfect; some of the pycnidia contained fasciculate groups of what were evidently immature asci, but repeated searches failed to find any ascospores. In Wyre Forest (Ws.), September, I found what was almost certainly a state of the same species, on the same habitat, but this form was identical with *Zythia rhinanthi* (Lib.), Sacc. Syll. Fung. iii. 615; Saccardo quotes *Sphæronema rhinanthi* Lib. under both. In this case also the pycnidia were minutely parenchymatous, and dark brown under the microscope; it was evidently not a *Zythia*, but a *Phoma*, but the contents of the pycnidia showed no mature spores.

197. **Diplodia buxi** (Fr.) Sacc. Syll. Fung. iii. 360. Var. **minor** *m.*

Pycnidiis ut in typo; sporulis valde variis, aliis ovatis continuis uniguttulatis, aliis oblongis 1-septatis fuscis 16–17 × 7–8 μ, muco obvolutis.

The sporules were in all stages of growth; some were ovate and continuous, others were distinctly uniseptate. Some had one large guttula, others were darker and biguttulate; the smallest ones had no guttula. Also they varied in colour from nearly colourless to fuscous olive; the smaller they were the paler; the septate ones were the largest, *e. g.*:—

Round or oval spores, nearly colourless	6 μ
Oval, pale brown, granular . . .	11 × 5 μ
Ovate, uniguttulate, darker . . .	13 × 8 μ
Oblong-ovate, biguttulate, darker still .	13 × 9 μ
Oblong-ellipsoid, uniseptate, fuscous .	16 × 8 μ

But they varied so much that any length could be found from 6 to 17 μ, combined with almost any width from 5 to 9 or 10 μ. The mass of sporules was involved in a granular viscid globule, which dissolved slowly in water.

On half-dead Box-leaves, Sutton Coldfield, January. The type specimens were on *dead* leaves of Box.

198. **Diplodina graminea** Sacc. Syll. Fung. iii. 413.

Pycnidia ovate-depressed or oblong, often 2 or 3 in a longitudinal series, black, formed beneath the cuticle, which is elevated and pierced by the ostiole, and finally in the compound groups is rimose. Sporules elliptic-oblong or subcylindrical, obtuse at both ends, tapering somewhat to the base, hyaline, delicately but clearly uniseptate, 14–16 × 4–5 μ, occasionally slightly curved, rarely constricted at the septum.

On culms of *Dactylis*, Selly Oak (Ws.), December. This seems to be so much like Saccardo's species that, although that was on *Cynodon Dactylon*, it is hardly possible to consider it even a variety. Under the microscope the texture of the pycnidium was subtranslucent-olive and parenchymatous. On the lower part of the same culm it passed into a leptostromatoid fungus, probably a *Scirrhia* (*? rimosa*, forma *Dactylidis*), in which the interior was filled with a dense mass of roundish white cells (a sclerotium), without any traces of asci.

199. **Stagonospora socia** *m.* Pycnidiis atris, ostiolo brevi, ab iis *Phyllachoræ junci*, quibus immiscebantur, non distinguendis; subinde autem discretis, stromati non immersis, et tunc minoribus. Sporulis oblongo-cylindricis, nonnunquam basi angustioribus, obtusis, hyalinis, 5-guttulatis (guttulis solito majoribus), dein 4-septatis, 30–35 μ × 10 μ.

In culmis exsiccatis *Junci conglomerati*, Frankley (Ws.), Sept., socia *Phyllachora junci*.

200. STAGONOSPORA GRAMINELLA Sacc. Syll. Fung. iii. 454.

Pycnidia gregarious, globose, minute, black, innate, then piercing the epidermis by a minute round pore; texture parenchymatous, subtranslucent-fuliginous. Sporules cylindrical, ends obtuse, 20–21 × 3½ μ, 4–6 guttulate, hyaline.

On leaves of grasses in a lawn, Handsworth (St.), September.

CRYPTOSTICTELLA, gen. nov.

Pycnidia erumpentia, globosa. Sporulæ 2-pluriseptatæ, utrinque 1-aristatæ, hyalinæ.

Est Stagonospora, sed sporulis aristatis, vel Cryptostictis sporulis hyalinis prædita.

201. **Cryptostictella bractearum** *m.* Pycnidiis erumpenti-superficialibus, minutissimis (60–100 μ diam.), dense gregariis, semiglobosis v. difformibus, atris, nitidis, subinde ruguloso-sulcatis, junioribus parenchymaticis, dein atris, carbonaceis, apice poro pertusis; sporulis paucis, cylindraceis, utrinque leviter attenuatis v. obtusis, e latere curvulis, hyalinis, 17–18 × 2½–3 μ, tenuiter 3–5-septatis, non constrictis, sub utroque apice oblique 1-aristatis (aristis 12–14 × 0·75 μ), basidiis brevibus suffultis. (Tab. 516, fig. 11.)

In pagina utraque bractearum *Tiliæ europææ*, Studley Castle, Dec.

99. RHABDOSPORA PLEOSPOROIDES Sacc. Syll. Fung. iii. 588.

This species, which I have previously recorded (Journ. Bot. 1886, p. 137) on *Rumex* from the Farne Islands, has since occurred at Earlswood (Wk.) on stems of *Heracleum*.

202. DISCULA MACROSPERMA (Peck), Sacc. Syll. Fung. iii. 675. Var. FRAXINI *m.*

Pycnidiis imperfectis, sparsis, primo epidermide pustulata

tectis, dein ea radiatim v. sulcatim fissa erumpentibus, atris, globosis, $\frac{1}{2}$–$\frac{3}{4}$ mm. diam., umbilicatis, denique patelliformibus. Sporulis hyalinis, intus granulosis, 30–40 × 12–13 μ, oblongo-ellipticis, basidiis rectis filiformibus 50 × $2\frac{1}{2}$ μ suffultis. (Tab. 516, fig. 13.)

In ramis *Fraxini excelsioris*, Over Whitacre (Wk.), April.

This variety differs from Peck's species in possessing a distinct black pycnidium, which, however, appears to be made from the cortex; it is at first globular, continuous all round, then opens at the top with an umbilicus, and gradually expands to a dirty whitish disc, surrounded by a black margin. The spores are remarkably large, and remind one of the conidia of a *Peronospora.* They are straight in front view, but curved when seen from the side.

There can be little doubt that *Phoma hyalina* Sacc. Syll. Fung iii. 88 (*Sphæropsis hyalina* B. et C.) is the young state of this species.

203. **Glœosporium phacidiellum** *m.* Maculis suborbicularibus, $\frac{1}{2}$–$1\frac{1}{2}$ cm. diam., albidis, margine angusto fusco cinctis; acervulis epiphyllis, numerosis, minutis, dilute fuscis, translucentibus, tectis, dein epidermide fissa 3–4 laciniis (ad instar Phacidii) coronatis; conidiis oblongis, obtusis, granulosis fere achrois, 18–20 × 7–8μ, basidiis crassis 40 × 6–7 μ suffultis.

In pagina superiore foliorum viventium *Pruni laurocerasi*, Studley Castle, Mar. Presumably the pycnidium stage of *Trochlia laurocerasi.*

204. **Glœosporium phillyreæ** *m.* Acervulis hypophyllis, non maculicolis, sparsis v. gregariis, atris, epidermide nigrificatâ tectis, dein poro albo pertuso erumpentibus, 150–250 μ. Conidiis hyalinis, ellipticis, interdum subacutatis, biguttulatis, 8–9 × 2–$2\frac{1}{2}$ μ.

In pagina inferiore foliorum emortuorum *Phillyreæ mediæ*, Studley Castle, April.

205. MARSSONIA DELASTREI Sacc. Syll. Fung. iii. 770; Trans. Brit. Myc. Soc. iii. 39.

Spots roundish, indeterminate, pale yellowish, indistinct; acervuli small, round, elevated, pallid in centre, with a narrow brown margin. Conidia about 25 × 6 μ, unequal, inæquilateral, clavate-pyriform, often curved, colourless, on short basidia, at length 1-septate below the middle, and oozing out as a white tendril.

On both surfaces of the leaves of *Lychnis diurna*, Berkswell (Wk.), August. Except for the short basidia, the earlier stages, on the same leaves, exactly resembled *Glœosporium lychnidis* Oud.

206. MARSSONIA CASTAGNEI Sacc. Syll. Fung. iii. 768.

Epiphyllous, forming round, confluent brown spots, without any darker margin. Conidia 25–26 × 9 μ, oblong-pyriform or clavate, curved, hyaline, distinctly septate below the middle, not constricted at the septum, oozing out and forming whitish tendrils.

On the upper surface of fading leaves of *Populus nigra*, Olton (Wk.), November. The spots covered more or less the whole surface of the leaf; under a lens, each spot could be seen dotted over with the little translucent acervuli of (undischarged) conidia.

The septum of the conidia was about $\frac{1}{4}$–$\frac{1}{3}$ of the length from the base.

207. Pestalozzia conigena (Lév.) Sacc. Syll. Fung. iii. 792.

Heaps of spores small, black, scattered or gregarious, erumpent, surrounded by the laciniæ of the torn epidermis. Conidia fusoid, 4-septate, the three middle loculi dark olivaceous, middle one usually darkest, 25–27 × 7 μ; pedicels short, very delicate; aristæ 2–3, shortish, stiff, pellucid, more or less recurved. (Tab. 516, fig. 12.)

On cones of *Thuja occidentalis*, Studley Castle, March. On the same cones was *Pleospora thujæ* m.; see no. 188.

208. Mucor plumbeus Bon. Abh. Nat.-forsch. Ges. Halle, viii. 109 (1864). *Mucor spinosus* Van Tieghem (1876); Fischer, Phycom. p. 203; Trans. Brit. Myc. Soc. i. 193, pl. 9, fig. 8; Grove, Journ. Econ. Biol. vi. pt. 2, p. 38, pl. iii. figs. 1–9.

Sporangiophore $\frac{1}{2}$–1 cm. high, branched. Sporangia round, up to 80 μ diam., brownish, at length black. Columella oblong or pear-shaped, provided at the summit with several (1–15) short stumpy or spiny processes. Spores spherical, smooth, 4–6 or even 8 μ diam., with a distinct greyish brown tint.

On various substances, Birmingham. There was mixed with it a variety (var. *recurvus* m., *l. c.*), in which the branches were curved arcuately downwards. Some observers have found the spores of this species to be rough, not smooth.

209. Peronospora alsinearum Casp. Fischer, Phycom. p. 452.

Conidiophores in dense whitish tufts, 200 μ high, dichotomous above; conidia ellipsoid, varying much in size and form, 26–29 × 16–21 μ. Oospores roundish, bright chestnut-brown, marked with a regular net-work of strong ridges.

On *Spergula arvensis* and *Stellaria media*. Oospores were abundant in early autumn, especially in the leaves, in both cases.

210. Peronospora potentillæ De Bary, Fischer, Phycomyc. p. 473.

Conidiophores forming small dense clusters here and there, 300 × 500 μ high; stalk slender, 4–5 times dichotomous in the upper one-third. Conidia ellipsoid, pale violet, about 22 × 16 μ. Oospores not seen.

On the under side of leaves of *Potentilla Fragariastrum*, Bewdley (Ws.), August, September. Also on *Sanguisorba officinalis*, Water Orton (Wk.). On the former, the conidiophores are mixed with the hairs of the leaf, which are longer than they, and so are not easily to be seen, were it not that the parts of the leaf which they occupy are distinctly visible on the upper side as pallid spots, each exactly delimited by venules.

211. Peronospora alta Fckl. Fischer, Phycomyc. p. 483.

Conidiophores in loose scattered tufts, chiefly on the under side, greyish, occupying large patches which show pale yellowish on the upper surface of the leaf, single or two or three together emerging from the stomata, slender, 200–400 μ high; branches confined to the upper third, 5-6 times forked, erecto-patent, undulately curved, branchlets acute curved, last fork producing two very unequal branchlets, of which the longer is mostly S-shaped, and the shorter strongly recurved. Conidia large, broadly elliptic, rounded at both ends, 29 × 21 μ.

On *Plantago major*, King's Norton (Ws.), July, August. The oospores of this species are said to be unknown.

212. Stilbum erythrocephalum (Ditm.) Sacc. Syll. Fung. iv. 567.

Gregarious, rather crowded; stem short, white, pubescent, obconical, crowned with a roundish, convex, rosy-orange head. Conidia ovoid, 5–6 × $2\frac{1}{2}$–3 μ, hyaline. (Tab. 516, fig. 10.)

On dung of rabbits, Randan Woods, October. Stem about 5 mm. high, clothed with delicate white hairs, and broadening gradually upwards.

Explanation of Plates.

Plate 515.—1. *Oospora hyalinula*, × 250, and spores, × 500. 2. *Œdocephalum glomerulosum*, *a*, × 50; *b*, head of spores; *c*, two heads denuded of spores and free spores, × 300. 3. *Penicillium ovoideum*, *a*, × 500; *b*, Coremium form, × 250. 4. *Sporotrichum chrysospermum*, *a*, × 150; *b*, hypha and spores, × 500. 5. *S. terricolum*, *a*, × 300; *b*, spores, × 500. 6. *Botrytis violacea*, *a*, × 500; *b*, spores, × 1000. 7. *Ovularia primulana*, × 500. 8. *Ramularia primulæ*, spores, × 250. 9. *Fusoma tenue*, spores, × 600. 10. *Tridentaria setigera*, × 600. 11. *Ramularia taraxaci*, × 500.

Plate 516.—1. *Hormiscium callisporum*, × 500. 2. *a*, *Periconia pycnospora*, × 250, and mature spores, × 500; *b*, *P. Desmazieri*, × 500. 3. *Zygodesmus fulvus*, × 250. 4. *Helminthosporium inconspicuum*, hypha, × 200, and spore, × 500. 5. *Scolecotrichum graminis*, *a*, × 350; *b*, spores, × 500. 6. *Heterosporium gracile*, spores, × 200. 7. *Septosporium elatius*, *a*, × 80; *b*, spores, × 250. 8. *Alternaria tenuis*, × 500. 9. *Hymenula callorioides* var. *corticis*, *a*, fertile hypha, × 500; *b*, sterile hypha of the sporodochium, × 250. 10. *Stilbum erythrocephalum*, × 80, and spores, × 500. 11. *Cryptostictella bractearum*, spore, × 1000. 12. *Pestalozzia conigena*, *a*, spore, × 500; *b*, × 750. 13. *Discula macrosperma* var. *fraxini*, spores, *a*, front view; *b*, side view, × 500.

NOTES ON *PLANTAGO*.

By Ruth M. Cardew, F.L.S., and E. G. Baker, F.L.S.

In working at the genus *Plantago* for Dr. Moss's Flora, the following points of interest have come under notice, in which we are not in entire agreement with other writers on the subject.

Plantago montana Hudson, Fl. Angl. p. 53 (1762). Dr. A. Brand, in the third edition of Koch's *Synopsis*, Band iii. p. 2193, 1903, has taken the name *P. montana* Huds. to be the same as the *P. montana* of Lamarck, a plant of Switzerland, &c. Lamarck (Illustr. i. 34 (1791)) diagnoses his *P. montana* and quotes *Plantago alpina angustifolia* Bauhin, Hist. iii. 506, as a synonym. This is well figured by Sturm (*Deutschlands Flora*, Heft 88, tab. 1 (1843)), and is entirely different from the *P. montana* of Hudson—a plant which Hudson himself, in the second edition of the *Flora Anglica*, reduced to a variety of *P. maritima*. See Journ. Bot. 1907, 23, where the matter is fully discussed.

P. SCORZONERÆFOLIA Lam. Illustr. p. 342 (1791). This plant was established by Lamarck on *P. armenia scorzoneræfolia*, Tournef. Cor. 5, 1703, from the Orient. There is a specimen from Tournefort of his plant in the National Herbarium. It has long, narrow leaves densely villose at the base. Dr. Williams considers it synonymous with *P. maritima* L. var. *latifolia* Syme, and names it var. *scorzonerifolia* Williams. We think it cannot be placed with var. *latifolia*, as the leaves in Tournefort's type are not particularly broad.

P. HIRSUTA Gilibert, Fl. Lithuanica, i. p. 17 (1781). In *English Botany* (ed. 3, vii. p. 172 (1867)), Syme describes a var. *hirsuta* of *P. maritima* L. from the Orkneys, which Dr. Williams considers synonymous with *P. hirsuta*. We have been unable to find specimens of this plant in herbaria, and more information seems desirable before accepting this identification.

P. ALPINA Linn. Sp. Pl. 114 (1753). Buchanan White in Trans. Bot. Soc. Edin. vol. x. 171 (1870), records *P. alpina* L. for alpine pastures, Ben Voirlich, Dumbartonshire. The leading characteristics of this species are:—

(*a*) The lanceolate-linear or linear leaves narrowed at both ends, ± thin, generally 3-nerved—the lateral nerves nearer to the margin than to the midrib.

(*b*) The ovate, pointed bracts.

(*c*) The capsules are shorter than in *P. maritima* L.

It may be added that the plant generally blackens when pressed.

Continental authors generally consider *P. alpina* L. as a distinct species, though closely allied to *P. maritima* L. and *P. recurvata* L.

We should be grateful for British specimens of any plants possessing the above characters, as the occurrence of the true plant in Britain is doubtful. Specimens may be sent to Botanical Dept., Natural History Museum, South Kensington.

P. CORONOPUS var. CRITHMIFOLIA Willkomm, in Willkomm & Lange, Prodr. Fl. Hisp. 2, p. 359 (1870). We are much indebted to Professor Henriques, of Coimbra University, for specimens of this variety. The leaves are ± 4 cm. long, not carnose, hirsute, bipinnati-partite, with the rachis dilated towards the apex, subtrinerved, laciniæ oval-lanceolate, and the peduncles ascending.

From the following localities British specimens in Herb. Mus. Brit. agree with this description:—Coast, Cladach Kirkibost, N. Uist, *W. A. Shoolbred* (in part); Sanday, Orkney, *Laing*; Isle of Walney, *E. Hodgson*; Dunnett, Caithness, *E. S. Marshall*.

Signor Béguinot, in his "Revisione monographica del genere *Plantago*," in Nuovo Giorn. Bot. Ital. vol. xviii. tav. xiv. fig. 4, (1911) figures a plant which greatly resembles the above, under the name var. *Columnæ*.

P. CORONOPUS var. LATIFOLIA DC. Fl. France iii. p. 417 (1805). De Candolle founds this variety on *P. Columnæ* of Gouan's Illustr. p. 6 (1773), and describes it as having "la feuille très grande et un peu différemment découpée." There are types of Gouan's plant in Herb. Kew, but neither in the type nor in Gouan's description has the plant a broad rachis to the leaf. The name seems, therefore, due to a misconception. Grenier & Godron (Fl. de France, ii. 72 (1852)) and Rouy & Foucaud (Fl. de France, x. 123 (1908)), describe a plant with a broad rachis. The var. *latifolia* of French authors is therefore a plant with a broad rachis, but the plant on which it is founded has a very narrow one. Gouan quotes as synonyms "*Coronopus maritimus minimus* Bauh. Prod. p. 98 (1620)," and "*Coronopus Neapolitanus tenuifolius* Col. Ecph. 158 [258] (1606), icon. bona," but we are unable to find this figure, unless it be the "*Coronopus lac.*" figured in pt. 2, p. 71. On the opposite page to the description of it on p. 258 is a figure of "*Plantago pilosa laciniata Apula*," a plant with a broad rachis, and we think this may have given rise to the misquotation. This latter is *P. Serraria* Linn. Sig. Béguinot considers that var. *Columnæ* Gouan is in part *P. Coronopus* L. var. *latifolia*, and identifies with it "*Coronopus laciniatus folio*, Columnæ Donati, Sempl. p. 30 (1631)," doubtfully quoting Columna's *Coronopus Neapolitanus tenuifolius* as a synonym.

P. MACRORRHIZA Poir. Voy. Barb. p. 114 (1789) (*macroriza*). Decaisne in DC. Prodr. xiii. i. 732 (1852) considers this synonymous with *P. ceratophyllon* Hoffm. & Link, and Dr. Williams in his *Prodromus*, p. 364, adopts the name *P. macrorrhiza* Poir. for the British plant recorded by one of us as *P. Coronopus* L. var. *ceratophyllon* Rapin (Journ. Bot. 1897, 257, t. 371). But *P. macrorrhiza* seems to us quite distinct from *P. ceratophyllon* in the following contrasted characters:—

P. ceratophyllon.	*P. macrorrhiza.*
Root thick, long.	Root thick, woody.
Leaves rather long, erect or suberect, 10–15 cm. or longer, subpinnatifid, laciniæ remote.	Leaves short, spreading in a rosette, 2·5–5 cm. long, spathulate, inciso-dentate, teeth imbricate mucronate.
Scape 15–20 cm.	Scape 5–15 cm.
Spike 2·5–14 cm.	Spike 2·5–7 cm.
Bracts longly acute, sub-sqarrose, equalling the flowers.	Bracts longer than the flowers.
Capsule generally tri-locular.	Capsule generally bi-locular.

P. macrorrhiza and *P. crithmoides* Desf. Fl. Atl. i. 140 (1798) are synonymous and are well figured by Boccone (Sic. 30, t. 15, f. 2 (1694). If this figure be compared with that of *P. ceratophyllon* (*Fl. Portugaise* i. 431, t. 74 (1809)), the great difference in the configuration of the leaf will be seen. We are inclined to consider the British plant a variety of *P. Coronopus*, but Mr. J. A. Wheldon, in an interesting letter to one of us on the plant known to him from Blackpool, considers it ought to be separated from *P. Coronopus*. He writes: "I should say it has never been fully described yet as probably all or most of the Herbarium plants are young. But in age the plant gets very large, divides repeatedly at the crown of the roots, and forms a dense cæspitose tuft which could not be dried without subdivision. The plate (Journ. Bot. 1897, t. 371) admirably represents the younger state, the erect leaves giving it quite a distinct look, but in older plants the crowding of the leaves still erect gives them a different appearance, longer and narrower and more toothed." The plant figured by Béguinot in his *Revisione* as *P. Coronopus* var. *ceratophyllon*, does not agree with the figure of *P. ceratophyllon* in the *Flora of Portugal*.

WAYFARING NOTES IN RHODESIA.*

By R. F. Rand, M.D., F.L.S.

(Concluded from vol. xlix. p. 249.)

Acalypha. *A. villicaulis* Rich. (no. 1384), *A. Allenii* Hutch.† (nos. 1385, 1386), *A. ciliata* Forsk. (no. 1388), and *Tragia* sp., near *T. Schinzii* Pax ‡ (no. 1387). All are nettle-like, and all are monœcious. The first two have anemophilous flowers. No. 1387 is entomophilous. No. 1388 requires further study, and may prove to be entomophilous. Its "drip-tip" is noticeable, few Rhodesian leaves having that feature; it is usually seen in herbaceous annuals whose short life begins and ends with the rains.

A. villicaulis Rich. The styles and stigmas are red. The apical position of the female flowers, while giving free access to wind-borne pollen, preserves them from the pollen gravitating from the male spikes lower down upon the stem. There is also the advantage that in time of fruit the exploding cocci have a wider range and an uninterrupted flight.

A. Allenii Hutch. The styles and stigmas are green. No. 1386, the same species as No. 1385, shows a curious character. The apical female spike, after its fruit is well set, develops a prolongation of its axis which bears male flowers; this, after the male spikes lower down upon the stem have withered. Lateral branches lower down upon the stem may be found bearing female spikes, and the late male development may be with a view to their pollination. The reversal in the position of the flowers in the ageing plant is interesting.

Tragia sp. near *T. Schinzii* Pax. A loose, straggling herb, with stinging hairs. The racemes are carried upright, all the flowers being male with the exception of the lowest one, which is female.

Male flowers.—Perianth-lobes 3. Stamens 3. Filaments short, bowed outwards, carrying a hooded anther above, the opening into the hood looking downwards and inwards towards the axis of the flower. The hood is acuminate above, the tip turned inwards, those of the three anthers touching in the middle line. The pollen-grains are ranged in a line just within the rim of the opening into the hooded cavity. This polleniferous line is wanting above. The hood protects the pollen from the rain, abundant at this season (December). The walls of the cavity are probably nectariferous, as flies may be seen probing it. The pollen-grains are slightly sticky.

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* The specimens referred to by numbers are in the National Herbarium.

† Named by Mr. John Hutchinson.

‡ Provisionally so named by Lt.-Col. Prain.

Female flower.—The perianth is large and protective, and accrescent in the fruit. There are three unbranched stylar arms, each coiling outwards in crosier-fashion, their upper convex surfaces only being swollen and stigmatic.

The flowers of this plant are frequented by flies, among which one with an orange-coloured body is conspicuous. The capsule is explosive, going off with a sharp crack when touched, throwing the cocci to a distance of several yards, the cocci at the same time opening to release the seeds.

CRINUM sp. (no. 228). In flower in mid-December. The long perianth-tube is ballooned above into a water-tight, flask-shaped cavity, pointed at the end. The flower is slightly zygomorphic, there being a little bulging at the side towards which the stamens lean. The anthers are versatile and black in colour. They dehisce before the flower opens. The style is nine inches or more in length, and straight. The stigma, like a small pin's head in size, is papillose at the crown. It is kept firmly pressed against the inner surface of the apex of the bud, and is thus shielded from auto-pollination. It escapes as the flower opens. The effort to secure a cross by a bending aside of the stamens rather than by a diversion of the style, the more general case, is interesting.

CEROPEGIA sp. (no. 1399).* A climber, with milky juice, twining around the stem of a small shrub. Flowers yellowish white. Calyx dotted with dark, brownish purple spots. Corolla-tube slightly hairy within along a line just above the level of the cuculli. Corolla-lobes with out-turned edges uniting at their tips. The eversion of the edges of the lobe forms a keel at the throat of the tube, and the five keels thus formed nearly block the tube. The cuculli are upright, bending slightly outwards above. The anther-tips are broad and erect, one opposite each cucullus. The pollinia were not seen, as the specimen was immature. Corpusculum showed two short retinacula projecting horizontally.

CEROPEGIA ABYSSINICA Dcne.† (no. 1400). Erect in habit. Height about one foot. Growing beneath trees upon the kopje. Leaves, stem, calyx, and its awl-like lobes, softly hairy. No milky juice. Flowers erect, drooping after fertilization. Corolla averages three-quarters of an inch in length, consisting in its lower half of a tube somewhat inflated below, narrowing above at the point whence the lobes spring. The lobes spread out to meet again in firm union at their tips, where they form a small round button. They enclose a cage-like space. The edges of the lobes are slightly reflexed below, but, above, where they are greenish in colour and firmer in texture, the reflection is much stronger. Externally the tube is of a pale purplish tint, while just below the middle point of the tube there is a regular band or zone, about one-eighth of an inch in width, which is dull white in colour and semi-transparent.

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* The flowers of this are too young to permit of the plant being named with certainty.

† This is a remarkable "find," since the species has been known only as a native of Abyssinia.

The general colour of the corolla within is a deep purplish black, the colour being denser in the upper portion of the flower. Upon removing the corolla-lobes and looking within the tubal portion of the flower, the object of the pale white band, seen from the outside, is at once apparent. It is a window which lights up the dark purplish black cuculli and the column which occupy the depths of the tube. At the extreme lower end of the tube is another light which illumines the lower portion of the column from below. The column is very short and crowned by the cuculli, whose limbs arch over it, meeting in the axis of the tube and then again curling outwards. The cuculli are united below into a circlet which clasps the head of the crown like a coronet. Opposite each of the five corpuscula and the stigmatic slits subtending them, the encircling portion of the cuculli shows a light-coloured, clear, crescentic portion, bounded upon either side by a tuft of bristly hairs, doubtless directive in their function. The insect thus has a clear, lighted path to the stigmatic slits. The remaining portions of the cuculli are deep purplish brown in colour. A few short, dark, and bristly asperities, mostly collected in the middle of the crescent, give the insect a sure foothold.

The stigmatic lobes project as an obtuse angle. The anther-tips are fleshy, orange-yellow in colour, and curl inwards towards the axis of the flower. The corpusculum is slightly expanded above, somewhat like a nail-head. Retinacula are scarcely existent, the pollinia being nearly sessile upon the corpusculum. The pollinia are egg-shaped, with a small transparent keel-like process, whose function it may be to engage the slit-like entrance to the stigmatic cavity.

In this flower, light is the lure which entices the insect to explore the recesses of the tube. The cage-like superstructure wards off undesirables. Looking within the tube one sees the diverging tips of the cuculli as a dark, star-shaped centre. Outside of the star are the five semi-transparent crescentic portions of the cucullar ring, a shaded spot in the middle of each marking the position of the roughened path to the stigmatic slits and corpuscula. The combination forms a design as beautiful as the motive is ingenious.

SOME LITTLE-KNOWN BRITISH BOTANISTS.

By James Britten, K.S.G., F.L.S., and G. S. Boulger, F.L.S.

While preparing a new edition of our *Biographical Index of British and Irish Botanists* we have met with the names of certain persons about whom comparatively little is known. We believe that most of them have done sufficient botanical work to entitle them to appear in the *Index*; but of many of them we know little more than names. We are anxious to learn further particulars as to the dates and places of their births, deaths, and burials, their full names and any references to their lives, portraits, or works, other than those which already appear in the *Index*, in which most are already included. We shall be much obliged to anyone who will furnish us with such information additional to that which is already given in our book or its supplements. Any information may be sent to Mr. Britten at 41 Boston Road, Brentford, Middlesex:—

Adams, John, F.L.S. Of Pembroke. Drowned about 1830.
Agnew, J. (fl. 1781–4). Drew fungi.
Alexander, H. T. (fl. 1833–45). Of Cork. Surgeon.
Allom, Elizabeth Anne (fl. 1841). Of Margate. Algologist.
Amos, William (fl. 1804). Of Brotherstoft, Lincolnshire. Agriculturist.
Apjohn, Mrs. (fl. 1855). Wife of Prof. James Apjohn. Algologist.
Aram, William (fl. 1770). Of Norwich?
Armitage, James (d. circ. 1838). Of Birmingham.
Artis, Edmund Tyrrell (fl. 1825).
Ashley, W. H. (fl. 1850), M.D. Of London.
Atkin, George (d. 1862?), M.D. Of Hull.
Atwood, Rev. E. Marcus (fl. 1858–63).

Badcock, Richard (fl. 1745). Of Kensington.
Baker, H. C. (fl. 1836). Captain, Bengal Artillery.
Ball, Anne E. (fl. 1840). Of Youghal. Algologist.
Bard, Samuel (fl. 1763). American pupil of Dr. John Hope, Edinburgh.
Barker, — (fl. 1697). Of Beccles. See Journ. Bot. 1901, 72.
Barton, John (fl. 1812–30). Of Chichester.
Bauchop, J. C. (fl. 1840). Of Edinburgh.
Bell, Miss (fl. 1832). Of Norfolk.
Bennett, John Whitchurch (fl. 1830), F.L.S.
Biddulph, Susanna (fl. 1790–1808). Of Southampton. Algologist.
Binfield, Rev. Edward (d. before 1813), A.L.S. Of Spettisbury.
Blinkworth, Richard (fl. 1830). Collected at Kumaon.
Bohun, Edmund (fl. 1700–2). Of Charleston, S. Carolina.
Boswarva, J. (fl. 1860). Algologist. Of Plymouth.
Bourne, Edward (fl. 1794).
Bradley, Henry (fl. 1779). Collected in China.
Brichan, Rev. James B. (fl. 1833–44). Of Banchory.

Brickell, Dr. John (fl. 1730–45). Of North Carolina.
Brodigan, Thomas (fl. 1830). Of Pilltown, Meath.
Bromfeild, William (fl. 1757).
Brown, John (d. 1873). Secretary, Edinburgh Field Club.
Brown, John William (1834–59). Of Otley, Yorkshire.
Bruce, R. (fl. 1801). Indian collector. See Journ. Bot. 1906, 238.
Burdon, Mrs. (d. 1885). Of Castle Eden.
Burgess, Henry W. (fl. 1827–31). Artist.
Burnett, James (fl. 1836), M.A.

Castle (or Castles), Robert (fl. 1840). Of Twickenham.
Charsley, Miss Fanny Anne (fl. 1867). Of Beaconsfield.
Chatterley, William Maddox (fl. 1839). Hon. Sec. Bot. Soc.
Childs, A. P. (fl. 1857). Author of 'Brit. Bot. Field Book.'
Chitty, Simon Casie (fl. 1834–59). Of Madras.
Churchill, James Morss (fl. 1831), F.L.S.
Clapham, Abraham. Pteridologist.
Clark, William (fl. 1826).
Clark, William Barnard (fl. 1840), M.D. Of Ipswich.
Clarke, Mrs. Louisa Lane (fl. 1852–65). Algologist.
Clarke, George (fl. 1840). Of Mahé, Seychelles.
Clements, — (fl. 1760). Of Isleworth.
Clinton, Dr. (fl. 1829). Of Dublin. Prof. Med. Bot.
Collins, James (fl. 1872). F.B.S.Ed. Economic Botanist.
Collins, Dr. (fl. 1820). Of Barbadoes.
Colvil, Lord (fl. 1718–20). Friend of Patrick Blair.
Colvill, William (fl. 1830). Of Arbroath.
Conway, Charles (fl. 1836). Of Monmouth?
Cowell, M. H. (fl. 1839). Of East Kent.
Coxhead, Henry (fl. 1842).
Cresswell, Rev. R. (fl. 1846). Of Salcombe and Sidmouth.
Crichton, Rev. Arthur (fl. 1818).
Cuff, — (fl. 1783–1800). Of Teddington. Grew rare plants.
Cullen, William Henry (fl. 1849), M.D. Of Sidmouth.
Curll, Dr. (fl. 1890?). Of Rangitikei, New Zealand. Pteridologist?
Curror, A. B. (fl. 1840), M.D., R.N.
Cutler, Catharine (d. 1866). Of Sidmouth. Algologist.

Davy, David Elisha (fl. 1805). Of Ufford and Yoxford, Suffolk.
Dean, William (fl. 1824). Gardener at Croome d'Abitot.
Dede, James (fl. 1809). Author of 'English Botanist's Companion.'
Dickson, Edward Dalzel (fl. 1840), M.D. Of Constantinople.
Dickson, Joseph (fl. 1839–74), M.D.
Dickson, R. W. (fl. 1806), M.D. Of Hendon.
Douglas, John (fl. 1864–5). Of Straffam, Kildare.
Dresser, Christopher (fl. 1859–86). Designer.
Duck, J. N. (fl. 1852). Of Bristol.
Dudley, Paul (fl. 1760?). MS. descriptions of New England plants.
Duncan, Rev. John Shute (fl. 1825–31). Keeper of Ashmolean.

(To be continued.)

EIGHTEENTH CENTURY WOMEN BOTANISTS.

[The following tribute to the women botanists of the eighteenth century is not likely to be known to many of the readers of the Journal and seems of sufficient interest to deserve reprinting. It is taken from the *Primitiæ Floræ Essequeboensis* of G. F. W. Meyer, published in 1818, p. 199.—Ed. Journ. Bot.]

Britanniæ summo maris imperio potitae, populisque orbis terrarum vel remotissimis re et ratione conjunctae, jam ex antiquissimis temporibus optima occasio ad thesauros rerum naturalium accipiendos et colligendos data fuit. Quae cum naturae indagatoribus summis et artificibus ingeniosissimis fecunda sit, nec non opibus tam publicis quam privatis, quae sumtus in libros iconesque edendas—licet maximos—faciendos affluat; mirum videri sane non debet, quod permagnam partem operum, quae scientiae gravissimis et splendidissimis adnumeranda, Anglis debeamus. Etiamsi tamen et aliae terrae interque eas Gallia praeprimis quae cum Britannia conferantur dignissimae sint, Britannia tamen ante omnes observatori eo conspicua redditur, quod et Feminae in studio botanico fovendo atque excolendo excellant, et patriae operibus botanicis nitorem inducere cum vero eruditionis artisque amore cordi habeant. Supra solita feminarum negotia evectae literarum studium juvant, et egregiis factis saeculi decorem extollentes, integram sui memoriam gratae posteritati relinquunt.

Jam ante multos annos Elisabetha Blackwell, et seriori tempore Celeberrima Lavrance operibus, quae classicis haud immerito adnumeranda, famam sibi paraverunt.—Nobilis virgo Hutchins nuperrime Bontajae in Hibernia defuncta, a Clar. Rob. Brown in *Hort. Kew. Tom. 4, p. 82.* instituto genere *Hutchinsia* nec non a Clar. Hooker in Jungermanniae generis splendidissima Monographia, cui titulus *British Jungermanniae. London. 1816.* in tabula prima proposita *Jungermannia Hutchinsiae* sempiternae memoriae tradita, botanices adeoque difficillimae hujus partis cryptogamiae studium ferventi amore coluit. Plures novas stirpes detexit, aliasque primum in Britannia legit, et sic egregia additamenta ad opus, cui titulus *English Botany* exhibuit. Herbarium insigne collegit, quod nunc una cum relicta copia elegantissimarum iconum et analysium plantarum ab ea ipsa delineatarum in manus Clarissimi Dawsonis Turner pervenit. Plures tabulae in illius opere magnifico quod inscriptum: *Fuci, sive plantarum fucorum generi a botanicis adscriptarum icones, descriptiones et historia. Londini. 1808 seq. Vol. 1–4.* a Celeberrima Hutchins depictae sunt. (*conf. t. 135. 187. 196. 227. etc.*) Eodem modo Cel. Dillwyn opus, cui titulus *British Confervae. London. 1809.* per eam adornatum est.

Sed et inter nunc viventes feminas plures eximio rei botanicae amore atque felicissimo in plantis delineandis ingenio eminent. Liceat nobis nonnullarum nomina cum honoris praefatione hic commemorare.

Domina Anna Rudge, uxor Illustris Eduardi Rudge Londini, femina nobilissima et ornatissima, cujus in gratiam *Nymphaeam Rudgeanam* nostram nominavimus, omnes icones ad opus mariti, cui titulus *Plantarum Gujanae icones et descriptiones hactenus ineditae. Lond. Vol. 1. 1805.* pertinentes, summa artis laude concinnavit. Quarum iconum elegantissimarum indolem habitumque naturae fidissimum, an exactitudinem botanicam qua delineatæ sunt, magis admireris, vix constare videtur. Ad secundam etiam partem operis dicti icones jam ab ea confectae sunt. Nec non delineationes in *Vol. X. Transact. Societ. Linn.* ab commentationem *A Description of several Species of Plants from New Holland, p. 283* tradidit.

Domina MARIA TURNER, uxor viri clarissimi de re botanica meritissimi DAWSONI TURNER Yarmouthi, femina varia multiplicique rerum cognitione imbuta, in edenda quam supra memoravimus *Fucologia* delineationibus elegantissimis, quibus eam condecoravit, eximiam laudem reperit. Tabulae quas delineavit et accuratissimis fructificationis partium analysibus illustravit, literis M. T. inscriptae sunt, et ad optimas operis pertinent. (*conf. tab. 100. 136. 140. 141. 145. 151. 157. 166. 171. 194. ètc.*)

Filiae ejus amabiles MARIA TURNER, conjux Celeberrimi HOOKER Halesworthi et ELISABETHA TURNER Yarmouthi parentium non modo ingenium, verum etiam cultum et eruditionem referunt. Ab ineunte aetate alterioribus literis artibusque deditæ, botanices etiam studium coluerunt. Domina HOOKER plures novos muscos invenit, et tam ea ipsa quam soror supra memorata magnam copiam iconum hucusque ineditarum muscorum frondosorum et hepaticorum partim delineaverunt, partim per matrem in chalcographia eruditae aeri inciderunt.

Praeter nobiles feminas, quas insigni modo de re botanica meritas hic nominatim exhibere nobis licuit, in opere Britanniæ maximum decus adferente, quod inscriptum *English Botany, or coloured Figures of british Plants, etc. auct.* EDW. SMITH *et* JAM. SOWERBY, vol. i–xxxiv. *London 1780 seq.* plura exempla commemorata leguntur, quibus feminae, plantis rarioribus observatis vel communicatis libri editoribus faverunt.

SHORT NOTES.

ALLIUM SPHÆROCEPHALUM L.—As there seems to be a somewhat general idea amongst botanists that *Allium sphærocephalum* is never bulbiferous, and as it is bulbiferous, viviparous, and capsuliferous, the following statement may be of interest. Many years ago I collected on a rocky slope at Martigny (Switzerland) some plants of this species with the bulbs. There were no bulbils in the flower-heads. I grew them in my garden (rich loam) in which there were no other Alliums. The next year all the flower-heads except one were bulbiferous or viviparous, in some instances mixed with a few flowers. I wrote to the Rev. E. F. Linton, who said that *A. vineale* L. must have got into the garden. As I was my own gardener, I knew that it was not so, but there the matter

had to rest for a time. Some years later I was in Jersey during the flowering season, and Mr. Piquet took me to the habitat of *A. sphærocephalum* in St. Aubin's Bay. I collected several of the large flower-heads with the bulbs, and planted them in my garden in quite a different part to the Martigny plants, which had died out. In the flower-heads when collected there were no bulbils. They behaved exactly as the Martigny plants had acted. I sent specimens to Mr. E. F. Linton, and he, with quite proper caution, refused to accept them as sufficient proof that this *Allium* is bulbiferous. I then wrote to Mr. Piquet, who replied that he was quite satisfied that *A. sphærocephalum* is both bulbiferous and viviparous, and he sent me a series of specimens in every stage. I sent part of these to Mr. Linton, and he thought that I had made out a strong case. It will be noticed that the weak link in the evidence from Mr. Linton's point of view would be that Mr. Piquet might have collected the flower-heads where *A. sphærocephalum* and *A. vineale* grew together. To eliminate this objection I again, on a recent visit to Jersey during the flowering season, collected some of the large flowering-heads with the bulbs, and planted them in another garden. They behaved in exactly the same way as before, being bulbiferous and viviparous, with here and there a flower but no flower-heads. It would seem, therefore, that when *A. sphærocephalum* is grown on a rocky slope, as at Martigny, or in blown sand, as in St. Aubin's Bay, there is a decided predominance of pure flower-heads; but that when grown in rich loam, as in my two gardens, there are practically no pure flower-heads and only rarely a few odd flowers. I must not let it be supposed that I have been destroying a rare plant. I have not taken from St. Aubin's Bay more than a dozen bulbs. As great changes are taking place in the bay very destructive to the flora, it is probable that in a few years *A. sphærocephalum* will be extinct there (Mr. Lester-Garland considers it is doomed), I felt I was doing no harm therefore in collecting a large quantity of seed and sowing it in the blown sand of the Quenvais. For fear, however, of causing confusion in the future, I want to put it on record that I sowed the seed on a spot where *A. vineale* was plentiful. Since writing the above, the Rev. E. S. Marshall has drawn my attention that Rouy (*Flore de France*, vol. xii. p. 353) mentions under *A. sphærocephalum* a var. *δ bulbiferum*.—E. W. Hunnybun.

Dorset Plants (p. 27).—I think my recent brief paper on Lyme Regis plants has been misread by Mr. Linton. My records are stated to refer to the district near Lyme, and this being on the confines of Dorset and Devon, two lists are given showing in which vice-county the plants were observed. No allusion is made to District A of Mansel-Pleydell's *Flora of Dorset*, but as Lyme is at its extreme south-west corner, the Dorset localities must perforce fall within it. The specific habitat for *Fœniculum vulgare* was intended to supplement the general station "Lyme Regis" of the *Flora* (ed. 2); and Sleeck Wood, near Uplyme, for which

Daphne Laureola was recorded owing to indigenous appearance is correctly shown for Dorset. Four species growing near Uplyme, but across the boundary, appear in the Devon list. *Petasites ovatus* was mentioned because, although the *Flora* states it to be generally distributed, I have never seen it anything but local in any part of Britain: in the *Flora of Hants*, ed. 2 (1904), it is said to be "not common; absent in Wight," and is recorded for six only out of twelve districts. With regard to *Glyceria procumbens* and *Festuca rottbœllioides*, the nearest station to Lyme shown in the second edition of the Dorset Flora is Burton Bradstock, which is some distance to the east of Bridport; and although Golden Cap, from which *Jasione montana* is recorded, is much nearer, yet it is well outside the radius of the Dorset localities in my paper.—H. W. PUGSLEY.

JOHN SNIPPENDALE.—In Journ. Bot. 1910, p. 142, appeared a question as to this person, of whom I then knew nothing. I have now found his name in Linnæus's *Bibliotheca Botanica* (1736, p. 73), whence it appears that "Joh. Snippendalius" was Professor of Botany in the "Hortus Medicus Amstelodamensis," of which he published a Catalogue in 1646. No further information is given in the later editions of the *Bibliotheca*, although these in other cases often supplement the first edition. This Catalogue is also mentioned in the first edition of Pritzel's *Thesaurus* (p. 279), where the author's name is spelt "Snippendal."—JAMES BRITTEN.

REVIEWS.

Vergleichende Physiologie. By AUGUST PÜTTER. Pp. viii + 721; 174 figs. Jena: Gustav Fischer, 1911.

THE comparative method has been used with great success on the morphological side of biology ever since the doctrine of evolution breathed new life into the dry bones of anatomy. On the physiological side, however, the rise of the comparative method has been of much slower growth. Physiologists have felt naturally that experiment was the chief weapon with which to attack their particular problems. But of late years it has been realized that even in this branch of biology comparison may prove a very valuable, though subsidiary, method for the elucidation of numerous physiological questions.

The term comparative physiology often is applied erroneously to the study of the physiology of organisms other than man. True comparative physiology is concerned with the fundamental unity of the life-processes of all living organisms, *i. e.* the general biological problem of organization, metabolism, and irritability. It is with such questions that Dr. Pütter is concerned in this weighty book of over seven hundred pages. The author points out that the study of the physiology of the lower animals, of plants in general, and of bacteria have all been carried on to a large extent on independent lines, by workers more or less ignorant of the achievements in other branches. An attempt is here made to discuss the problems of the fundamental processes of life in the light of the results obtained from all the various branches of biological study. It is clear that the task is no light one, for the field to be surveyed is of great extent, but the author must be congratulated on the laborious care with which the most pregnant physiological results have been collected from biological literature generally, and the skilful way in which they have been combined to elucidate the various problems.

The first chapter deals with the physical and chemical nature of protoplasm; then the important question of metabolism is brought under survey, and a sharp distinction is made between Betriebstoffwechsel and Baustoffwechsel, which roughly correspond to our constructive and destructive metabolism. In this chapter respiration in plants and animals is dealt with in a most illuminating way, and the variety of materials consumed in this process is well brought out. When one considers that such diverse substances as hydrogen, methane, ammonium salts, nitrites, sulphur, hydrogen sulphide, thiosulphates, and ferrous salts can all be oxidized in respiration, Pflüger's conception of that process as a combustion of the protoplasm itself becomes hardly tenable. It may be noted that in dealing with fermentation the work of Potter (Proc. Roy. Soc. 80, 1908) is overlooked, for the statement is made that no organism has yet been found capable of acting on carbon itself.

In the third chapter the processes of nutrition are passed in review, the phyto-synthetic assimilation of green plants being first considered. The different types of nutrition are discussed, and the unsatisfactory nature of the distinction between autotrophism and heterotrophism is pointed out. The disputed question of the mode of nutrition of aquatic animals is fully discussed. Pütter naturally supports the view, which he first put forward some years ago, that the vegetable life of the water is not sufficient to supply the needs of the animal life. He brings forward strong evidence that many aquatic animals absorb all, or a major portion of, their nutriment from dissolved organic substances in the water. In the case of one of the *Daphnidæ* (water-fleas) the capacity to live for some time and develop in aquarium-water containing no solid material has been definitely shown. In later chapters the exchange of material, the conditions of life, the conversion of energy in the organism are considered, and finally the phenomena of irritability and the nervous system in general. The author shows a thorough grasp of problems in plant physiology, due largely, no doubt, to Pfeffer's stimulating work which Dr. Pütter acknowledges to have made a lasting impression on his outlook on biology.

The book can be confidently recommended to botanists as a work in which the zoological aspects of physiological problems are combined with the botanical in a most illuminating way.

V. H. Blackman.

Vorträge über Botanische Stammesgeschichte—Ein Lehrbuch der Pflanzensystematik. Von J. P. Lotsy. Bd. iii.—Cormophyta Siphonogamia, Erster Teil. 8vo, pp. 1055, tt. 661. Jena: Fischer. 1911. Price 30 mark.

With the completion of this volume Dr. Lotsy approaches the end of his great work on the special morphology and classification of the great plant groups. One-third of the present ponderous volume is devoted to Gymnosperms, the remainder to a portion of the Angiosperms. The book is profusely illustrated; but after allowing for the space occupied by the figures there remains sufficient subject-matter to render the volume one which will demand the very serious consideration of the student, and which will provide the teacher with much matter for reflection.

Dr. Lotsy, with the indefatigable energy which he has shown throughout this important work, has not only brought together facts, but has also considered the various theories on the origin and relationships of the different groups and their divisions. And having considered these, Dr. Lotsy does not hesitate to give his own opinion on the matter in question and arrange his subjects accordingly. Hence, while it is improbable that his system will meet with general acceptance—there is a vast deal to be done, for instance, before we can fully understand the relationships of the constituent divisions of the Angiosperms—Dr. Lotsy's work must demand consideration as a capable attempt to solve some of the problems involved in these relationships.

It is impossible in the scope of a short review to do justice to the mass of facts and suggestions which Dr. Lotsy has brought together, but some idea of the nature and arrangement of the subject-matter may be given.

First, as regards the Gymnosperms, to which eleven lectures are devoted. They are studied under two heads—Conifers and Gnetales. The Conifers are divided into two groups—Florales and Inflorescentiales; the former includes the *Podocarpineæ*, *Araucarineæ*, and *Cupressineæ*, in which, in the author's opinion, the female "cone" represents a flower; the latter includes the *Taxineæ*, *Taxodineæ*, and *Abietineæ*, in which the female cone represents an inflorescence. The position of *Taxineæ* in the second group is explained by *Cephalotaxus*, which is regarded as a connecting-link. Between the two groups "there appears to be no direct relationship," at any rate their common origin lies very far back. For while there is every reason to derive the Inflorescentiales from the Cycad group, the origin of the Florales is obscure. The author suggests that they have sprung from the vascular cryptogams before the differentiation of the great Cycad group, which has given rise to the younger division, the Inflorescentiales. Gnetales are exhaustively considered, and Pearson's suggestion of their division into *Ephedroideæ* (*Ephedra*) and *Gnetoideæ* (*Gnetum* and *Welwitschia*) is adopted. The author concludes that the group represents the end of a developmental-series, and therefore the Angiosperms cannot be derived from it.

In his arrangement of the Angiosperms Dr. Lotsy has been much influenced by the views of relationships put forward by Dr. Hallier. In his treatment of the second great group of seed-plants, he starts from the *Polycarpicæ*—Hallier's Proterogenes—which includes the following families: *Anonales*, *Piperinæ*, *Ranales*, *Nepenthales*, *Aristolochiales*, *Rhœadinæ*, and *Hamamelinæ*. But while practically accepting Hallier's definition and views of relationship of these families, Dr. Lotsy breaks into the series by deriving from two different portions of it the great group of the Monocotyledons.

Incidentally he discusses the origin of Monocotyledons, and while fully agreeing with Miss Sargant in deriving them from dicotyledonous ancestors, he cannot admit that all Monocotyledons are syncotylous. Heterocotyly must also be considered, and in this respect, for instance, he regards the *Gramineæ* as retaining a trace of the second cotyledon in the epiblast. In a word, the Monocotyledons are not monophyletic, but have been derived by at least two paths of descent from the Dicotyledons. Hence, in Dr. Lotsy's arrangement, the spadicifloral Monocotyledons follow the Piperales, while the rest of the group finds its place immediately after the Ranales. In the arrangement of the second and larger phylum he follows Wettstein, and begins with the *Helobieæ*, of which *Alismaceæ* is regarded as the most primitive order; next come the *Liliifloræ*, in which the type reaches its strongest development, and from which extreme adaptation to insect pollination has led to the development of the *Scitamineæ* and *Gynandræ*, and extreme adaptation to wind-pollination to the development of the *Glumifloræ*. A departure from Wettstein's arrangement is the derivation of *Enantioblastæ* from *Helobiæ* and not from *Liliifloræ*.

It must not, however, be supposed that, in starting with the *Polycarpicæ*, Dr. Lotsy is convinced of the superior antiquity of this series as compared with the *Monochlamydeæ*. The question is broached in his introductory chapters on the angiospermous flower, but is left unanswered. Dr. Lotsy returns to it in the last chapter after a discussion on the definition and constitution of the *Hamamelinæ*, and on *Casuarina* and *Juliana*. But he can arrive at no decision. Facts are wanting to decide between the two opposing views, each of which embraces alternatives. Is the angiosperm flower a strobilus and derived from a unisexual Cycad flower, or from an hermaphrodite strobilus like that of *Bennettites*? Or is it an inflorescence, and to be derived from *Bennettites* (supposing, with Lignier, the *Bennettites* fructification to be an inflorescence), or, as Wettstein has suggested, from *Ephedra*-like ancestors? The author can only reply, "Ich weiss es nicht."

A. B. R.

BOOK-NOTES, NEWS, &c.

The announcement in April last of the death of Charles Du Bois Larbalestier, at St. Helier's, Jersey, must have come to many like an echo of far-away days. He was one of a group of keen field botanists who, between forty and fifty years ago, devoted themselves especially to the study of lichens, and collected these little-known plants in all parts of the country. To their labours we owe the discovery of many rare species, and the high position we now hold in lichenology. Charles Larbalestier was a native of Jersey. When, in due course, he entered St. John's College, Cambridge, his love of natural science was already strongly developed, and while still a student he became an associate of the Ray Club, with such well-known men as Sedgwick, J. Couch Adams, and C. C. Babington. After taking his M.A. degree, he went as tutor to reside in Connemara, where he devoted himself specially to the study of lichens, and found many species not only new to Ireland but new to science. Nylander, the great Continental lichenologist, was then at the height of his activity, publishing in *Flora* from the year 1863 onwards list after list of new European lichens; and in these the name of Larbalestier continually occurs: the Irish records bear dates from 1870 to 1877. During that time Larbalestier visited the Channel Islands and made useful collections there: between the years 1867 and 1872 he issued his *Lichenes Cæsarienses et Sargienses*—two hundred and eighty specimens in about six fascicles. He was in close communication with Leighton, who was then preparing the third edition of his *Lichen-Flora*, and who (in 1879) dedicated the volume to him—"To no one," he writes, "can I more appropriately dedicate this third edition of my *Lichen-Flora* than to you, whose marvellous researches in the West of Ireland and elsewhere, conducted with consummate skill, zeal, and perseverance, have added so largely to our knowledge, and whose unvarying kindness and friendship in communicating authentic specimens of novelties have rendered me service in the preparation of this work." About this time (1879–81) Larbalestier began to issue his Lichen Herbarium of three hundred and sixty specimens in nine fascicles, collected chiefly in the east and south of England and in West Ireland. In 1882 he became a Fellow of the Linnean Society. Leighton dedicated two lichens to him—both unfortunately identical with species already described; a more recent discovery, *Microglæna Larbalestieri* A. L. Sm., will, it is hoped, remain a permanent record in our Lichen Flora. After a period of comparative rest, Larbalestier began again his work of collecting while residing at Cambridge; he issued in 1896 a fascicle containing thirty-five specimens of "*Lichenes exsiccati circa Cantabrigiam collecti*," of which very few copies seem to have been published. In his later years Larbalestier retired to St. Helier, where he died on April 4th, 1911. We are indebted to his friend the Rev. E. L. Bloomfield, Rector of Guestling, near Hastings, for many of the above particulars. Larbalestier's own collection of specimens was bought by Mr. Wm. Cadbury for the University of Birmingham; but during his lifetime he gave freely to his fellow-workers, and many of his specimens included in the lichen herbaria of Joshua, Holl, Pigott, Davies, Crombie, and others have come into the possession of the British Museum.—A. L. S.

At the meeting of the Linnean Society on Dec. 21, the President, Dr. D. H. Scott, referred to the loss sustained by the Society in the death of Sir Joseph Hooker, beyond doubt their most distinguished Fellow. He was elected June 7, 1842, over sixty-nine years ago, and served on the Council, with only short intermissions, from 1846 to 1884; he was Vice-President during a great part of that time, and exercised a great influence on the affairs of the Society. Much of his best work, so far as it was not in book-form, was published by the Society—his memoirs on the Flora of the Galapagos Islands, the distribution of Arctic plants, and the classic memoir on *Welwitschia mirabilis*. The Society hoped to have the honour of publishing his latest work, on the genus *Impatiens*, on which he was actively engaged during the last years of his life. The following Resolution was then moved from the chair:—"The Fellows of the Linnean Society of London, in General Meeting assembled, desire to place upon record their profound sense of the loss to the Society and to the world of science, occasioned by the death of Sir Joseph Dalton Hooker on the 10th December, and their pride in his having been a Fellow of the Linnean Society for nearly seventy years, during which, by his scientific contributions to the Society's publications and his advice throughout his many years of service on the Council, he greatly added to the prestige and efficiency of the Society." The Resolution was carried unanimously, the Fellows rising in their places.

The *Proceedings of the Linnean Society* for 1910–11 contains among other interesting matter Mr. Gepp's report of the results of deliberations of the Brussels Congress as to the nomenclature of algæ, mosses, hepatics, and ferns and a history by the General Secretary, Dr. B. Daydon Jackson, of the portrait of Linnæus by Alexander Roslin (of which a reproduction is given), with remarks on the "Lapland drum" represented in Hoffmann's frontispiece to the *Flora Lapponica*; Dr. Scott's presidential address and the usual obituary notices are also included.

The work of Eugenio Rignano, now translated by Mr. Basil C. Harvey under the title *Upon the Inheritance of Acquired Characters* (Chicago: Open Court Publishing Co., 1911, price 3 dols.), appeared for the first time in French in 1906, and attracted some attention as the work of an engineer—very conversant with the literature of the subject with which he was dealing—rather than a professed biologist. The writer commences by the somewhat remarkable statement that Haeckel's fundamental biogenetic law that ontogeny is a recapitulation of phylogeny is "now perhaps irrefutably" established, a dictum with which probably few biologists would find themselves in agreement; indeed, one of the most recent writers on the subject, Professor Kellogg, goes so far as to say that "the recapitulation theory is mostly wrong; and what is right in it is mostly so covered up by the wrong part that few biologists longer have any confidence in discovering the right." The author's theory—his centro-epigenetic hypothesis—is that the germinal substance, although limited to a single zone and separated and differentiated from the rest of the soma, nevertheless exercises its epigenetic, formative action upon all the rest of the organism and during the whole of development, without undergoing any alteration whatever through this participation in development. We cannot say that his exposition, though interesting, seems to bring us any nearer to the solution of the difficulties which it proposes to explain.

In Ferdinand Filarszky's *Botanische Ergebnisse der Forschungsreisen von M. v. Déchy im Kaukasus* we have a general account of the collections amassed during several expeditions to the Caucasus, partly by von Déchy but chiefly by collectors who accompanied him. The determination has been effected by various experts, whose names are given in the introduction. Altogether forty-seven new plants are described, twenty-one being flowering plants. The plates are collotype reproductions from drawings by A. Jávorka, K. Czógler, E. Levier, Ch. Cuisin, and one or two others. The text extends to 126 pages, unhappily printed on the so-called art paper, highly calendered and faced with china clay, which does not promise to last. The enumeration is followed by a bibliography and list of stations.

The *Journal of the Friends' Historical Society* for August last contains an interesting article by Mr. W. F. Miller on "Sydney Parkinson and his Drawings," which includes a summary of all that is known about him and his parents, and a letter from Parkinson to Fothergill, written during the voyage of the *Endeavour* (on which, as is well-known, Parkinson accompanied Banks as botanical draughtsman) and hitherto unpublished.

The number of the *New Phytologist* published on December 23 contains an interesting account of the "floristic results" of the International Phytogeographical Excursion in the British Isles undertaken last autumn by various British and Continental botanists. The results are summarized by Mr. G. C. Druce, the author of the account, who "feels, as a floristic botanist, that in future he must not be content with merely looking at or studying the individual, but must also investigate its neighbours and environment." "Through the acumen of Dr. Ostenfeld," he says, "a new water-lily [*Nymphæa candida* Presl] and a lady's mantle [*Alchemilla acutidens* Buser] have been added to our flora, Prof. Massart pointed out a new 'variety' of *Sagina nodosa* [*S. glabra* Fenzl] and Dr. Graebner urged that *Juncus ranarius* has claims to specific rank. Prof. Graebner also showed the members a variety *Erikæ* of *Calluna vulgaris*, which Prof. Ascheron had named after Frau Erika Graebner, while Dr. Lindman directed attention to a hitherto undescribed form of *Polygonum aviculare*." Mr. Druce also describes numerous varieties and indicates further possibilities in the way of additions of names to our lists.

Jean Baptiste Edouard Bornet, the veteran algologist, died in Paris on the 8th December, 1911, at the age of 83.

FIRST Steps in the Principles of Flower Classification according to the Natural System. By Rev. A. C. Morris.

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BRITISH AND FOREIGN

EDITED BY

JAMES BRITTEN, K.S.G., F.L.S.

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GEORGE ROBERT MILNE MURRAY

GEORGE ROBERT MILNE MURRAY.
(1858–1911.)

(WITH PORTRAIT.)

A NAME for many years familiar to readers of this Journal has been removed from the list of British botanists by the death of George Robert Milne Murray, which occurred at Stonehaven, Kincardineshire, on the 16th of December last.

He was born at Arbroath, Nov. 11, 1858, and educated at the High School there; after this he went to Strassburg, where he studied under De Bary, and, returning to London, was towards the end of 1876 appointed as junior assistant in the Department of Botany in the British Museum, the whole of which was then contained in the building at Bloomsbury. Here the fungi and algæ were placed in his charge. Those who remember the cramped condition of the Department in the old building will be able to contrast it with its extent at present; those who do not may form some idea of this when it is stated that the work of arranging the fungi had to be carried on in a small and uncomfortable iron gallery erected for the purpose. Murray had fully utilized his stay at Strassburg, and his knowledge of the German language and literature proved of great value, not only to the Department, but also to this Journal, to which he at once became a contributor; a note from his pen on the reproduction of the Ascomycetes appears in the issue for March, 1877. In 1878 he was elected a Fellow of the Linnean Society—this, apparently, in exception to the Bye-law which states that "no person shall be capable of being elected a Fellow until he shall have fully attained the age of twenty-one years." In 1879 he contributed the article on Fungi to vol. ix. of the *Encyclopædia Britannica*; one on Vegetable Parasitism appeared in vol. xviii. (1885).

The transference of the botanical collections to South Kensington, 1880, was mainly conducted by Murray, who in the new Museum found sufficient space for the proper arrangement of the cryptogams—an occupation which naturally required much time and trouble. In 1882 he was entrusted by Huxley with investigations into the salmon disease, in connection with which he published three reports, extracts from which will be found in this Journal for 1885, pp. 302–308; the "potato fungus" had previously engaged his attention. In this year he became lecturer of botany at St. George's Hospital Medical School—a post which he held for four years.

From this time onward Murray's work was practically confined to Marine Algæ. In 1887 he published (Ann. Mag. Nat. Hist.) a catalogue of the Ceylon Algæ in the British Museum, and in 1888–9 printed in this Journal a list of West Indian Algæ, largely based on the Museum collections and on his own observations during the Solar Eclipse expedition in 1886, to which he was attached. In 1889 he published, in conjunction with A. W.

Bennett, a useful and needed *Handbook of Cryptogamic Botany*, which was reviewed at great length in this Journal for the same year (pp. 277–286).

In 1891 Murray published in the *Transactions of the Liverpool Biological Society* a paper on the distribution of Marine Algæ in time and space, which is highly spoken of by Batters in this Journal for the same year (p. 254). In the following year appeared under his editorship the first number of *Phycological Memoirs*, which was projected to contain the researches made by a small school of algological students that he had established in the Department; the second part appeared in 1893, and the third in 1895; to this he contributed several papers. In the last-named year he became Keeper of the Department of Botany on the retirement of Mr. Carruthers and published his *Introduction to the Study of Seaweeds*, which at once took its place among useful handbooks. In 1897 he was elected a Fellow of the Royal Society.

It is not intended to give here a complete list of Murray's numerous contributions to botanical literature: an enumeration of those in this Journal alone which included biographies and reviews—the latter often amusing and good specimens of his literary style—would occupy considerable space. The memoirs on *Avrainvillea*, *Boodlea*, and *Struvea* may be cited as good examples of his systematic work. He was an enthusiastic collector; under this head I cannot do better than quote a note contributed to the *Times* of Dec. 21 by one who had been his companion on the voyage described:—

"He was quite indefatigable in the collection of the minute vegetable organisms present in sea-water, crossing the Atlantic to the West Indies or to Central America several times for the purpose of collecting during the voyage. From the Scotch Fishery Board steam yacht, the 'Garland,' he collected Diatoms in almost every one of the Scotch lochs. Not only was he enthusiastic himself, but his enthusiasm was so infectious that he was able to persuade several captains of ocean-going steamers to learn the method of collecting Diatoms, and to collect material for his studies while they were voyaging in the Atlantic, Pacific, Arctic, and Indian Oceans, and in the Red and the China Seas. In 1898 he himself chartered a tug and proceeded in the month of November to a part of the Atlantic three hundred miles west of Ireland, where the depth quickly increases to as much as two miles, to collect organisms at numerous measured intervals between the surface and the ocean bed; on this voyage he was accompanied by Prof. V. H. Blackman, Professor J. W. Gregory, Mr. L. Fletcher, Mr. J. E. S. Moore, and Dr. L. Sambon. That part of the ocean was so far from the beaten track that no other boat was sighted within a space of ten days. Just as the more important work was finished a gale came on of such violence that a train running on the nearest land was blown completely off the rails."

As a result of these voyages, the study of plankton began to absorb Murray's attention; his observations contributed to a Report of the Fishery Board of Scotland are reprinted in this

Journal for 1897 (pp. 387–395); his last contribution to our pages was on Atlantic *Diatomaceæ* (Journ. Bot. 1903, 275), the material for which was collected by himself and Mr. Blackman in 1897.

In 1901 Murray was appointed temporary scientific director to the National Antarctic Expedition and edited the *Antarctic Manual* for the use of the staff of the 'Discovery.' It had been intended that he should accompany the ship to Melbourne, but the decision to go direct to New Zealand compelled his return when he had reached the Cape, on account of his official duties at the Museum. The preparations attendant on the voyage, in which Murray was keenly interested, necessitated much work on his part and frequent absences from the Museum, and the consequent excitement acted unfavourably upon his constitution. In the earlier part of the year Murray had to give evidence on behalf of the Department of Botany before the Committee appointed to consider the relations between the botanical work and collections at the British Museum and Kew, and the knowledge that there was in some quarters a strong feeling in favour of the amalgamation of the two establishments naturally made this an anxious task. On his return from the Cape, his excitable condition was very noticeable, and the death of his wife in the following year further affected his mental balance. He still continued his interest in matters botanical, notably those connected with the Linnean Society; but his power of concentration had become seriously relaxed, and caused much anxiety to his colleagues. As time went on, the symptoms of strain became more pronounced, and when, in July, 1905, he tendered his resignation, their regret was accompanied with a certain sense of relief.

On leaving the Museum, Murray abandoned botanical work and retired to Stonehaven, where his holidays for many years had been spent. From this time his former colleagues heard little or nothing of him, and the announcement of his death, the immediate cause of which was cancer of the throat, came as somewhat of a shock.

Those who knew Murray at his best period, at which the accompanying portrait was taken, will endorse the estimate of the writer in the *Times* already quoted: "He was an excellent companion, very kind-hearted, always ready with help and sympathy for those who needed it." He had a fund of amusing anecdote with regard to himself and others; and if *non è vero* were objected to any of his narrations the compliment *è ben trovato* could not be withheld. He was a good lecturer and had an excellent literary style. When he was appointed Keeper of his Department, I said: "His uniform brightness, his geniality, his readiness to help, and his unfailing courtesy, will secure for him the good wishes of his numerous friends"*; and it is with a feeling of sadness at the termination of what promised to be a long and brilliant career that I lay down my pen.

James Britten.

---

* Journ. Bot. 1905, 185.

G 2

SAMUEL CORBYN'S CATALOGUE OF CAMBRIDGE PLANTS.

By G. Claridge Druce, M.A., F.L.S.

Some years ago, on the death of the veteran botanist William Pamplin in 1899 (see Journ. Bot. 1899, 521), his herbarium, containing plants of his Welsh parish, Llanderfel, near Bala, and a considerable quantity of botanical correspondence came into my possession. Among the latter was a list of Cambridge plants, in the handwriting of Samuel Corbyn. Of this botanist I have been unable to obtain little information, but an examination of the books at Trinity College revealed the fact that he was admitted to that college (from Worcestershire) on June 18, 1648. It is somewhat remarkable that Ray, who was his contemporary at the same college, has never referred to Corbyn, who was evidently a capable botanist, in any of his works. Whether religious differences, which then ran high, was the cause can only be surmised.

There is a letter dated Nov. 4, 1656, from Trinity College, showing that he was for some time in Cambridge, which I conjecture may have been written to William How. It runs as follows:—

"Sir,—Some of your plants are gratefullie accepted of to us as being rare, so shall I have heare sent you a Catalogue of those plants out of our gardens with which we conceive you are not furnished, and shall request that you in your letter to mee, to returne a Catalogue of your garden or field plants which you thinke are rarities with us soon we shall thinke of convenient wayes to make exchanges. I shall be readie to acknowledge youre favours I have or may receive from you. I am your friende to serve you. —S. Corbyn.

"**Trin. Coll. in Cambridge, Nov. 4, 1656.**

"I know not whether you may be furnished with most of those all ready therefore you may be pleased to write [me] word that those are which you desire and I with friends shal endeavour to supplie you if I can, and I shall in like manner upon further intercourse acquainte you with our desires. In youre next letter I shall intreate the seeds of those which I indicated from you."

Then follows a list of forty-seven species, including "Pulsatilla, Gramen Parnassi, Myrtus Brabantica, Osmunda regalis, Antirrhinum minimum, Herba Paris, Pes Cati flo. albo, Jacobæa montana lanuginosa, Triorchis, Rubeola arvensis repens, and Calamintha montana minor," which may be presumed to be wild plants of the vicinity.

Corbyn's list of Cambridge plants is especially interesting since it precedes Ray's *Catalogus* by three years. His names are taken from Gerard, *Herbal*, 1633 (he abbreviates the reference to the *Herbal* to "G.," or Parkinson, *Theatrum*, of 1640, which is cited as "P."). I have added modern synonymy. Two plants, *Melampyrum cristatum* L. and *Senecio paludosus* L. are mentioned for the first time in this list as British species. The list is entitled "A Catalogue of Plants, First those which growe wild with us about Cambridge, except those mentioned in Text. 20 May, 1657."

"Sambucus aquatica G. 1424" = *Viburnum Opulus* L.

"Ribesium sylvestre, found in Kent and Bedfordshire" = *Ribes rubrum* L., already recorded by Turner in the *Herbal* of 1568.

"Bifolium" = *Listera ovata* Br.

"Nummularia minor fl. purpurascente G. 630" = *Anagallis tenella* Murray.

"Polygala fl. cærule & purpureo G. 563" = *Polgala vulgaris* L.

"Valeriana sylvestris major et minor G. 1675" = *Valeriana sambucifolia* Mikan et *V. officinalis* L.

"Viburnum G. 1490" = *V. Lantana* L.

"Anemone nemorum alba G. 383" = *Anemone nemorosa* L.

"Anagallis lutea nemorum G. 618" = *Lysimachia nemorum* L.

"Veratrum nigrum; Helleborastrum P. [G.] 976" = *Helleborus viridis* L.

"Lysimachia lutea minor G. 474," probably *L. vulgaris* L.

"Ranunculus flammeus major G. 961" = *R. Lingua* L.

"Brassica marina monospermos I. Anglia G. 315 found at Hyde in Kent" = *Crambe maritima* L.

"Circæa Lutetiana."

"Linum Catharticum G. 550 [559]."

"L. sylvestre cæruleum l. angustifolium cæruleo flore maiore Park 1335" = *L. perenne* L.

"Serratula G. 713" = *S. tinctoria* L.

"Cotyledon palustris Park. 1214" = *Hydrocotyle vulgaris* L.

"Lamium luteum P. 606" = *L. Galeobdolon* Crantz.

"Lathyrus maior latifolia G. 1229" = *L. sylvestris* L.

"Orchis Serapias bifol. sive trifolia minor P. 1350" = *Habenaria bifolia* Br.

"Coronopus Ruellii G. 427" = *C. procumbens* Gilib.

"Caucalis minor flore rubente Park. 921 G. 1022" = *Caucalis arvensis* Huds.

"Conyza maior Baccharis monspeliensum G. 792" = *Inula squarrosa* Bernh.

"Trachelium minus G. 449" = *Campanula glomerata* L.

"Eruca aquatica G. 248" = *Radicula sylvestris* Druce.

"Raphanus aquatica Park. 1226 [1228]" = *R. amphibea* Druce.

"Pinguicula i. Sanicula Eboracensis G. 788" = *Pinguicula vulgaris* L.

"Gramen tomentosum G. 29" = *Eriophorum polystachion* L.

"Solanum lethale" = *Atropa Belladonna* L.

"Helianthemum i. Chamæcistus Anglica G. 1281" = *Helianthemum Chamæcistus* Mill.

"Serpillum hirsutum G. 671" = *Thymus Serpyllum* L. agg. var. *hirstunm.*

"Euonymus Theophrasti G. 1468" = *E. europæus* L.

"Mollugo montana G. 1127" = *Galium hercynicum* Weig.

"Ros solis folio oblongo G. 1536" = probably *Drosera longifolia* L.

"Anthyllis Leguminosa G. 1243" = *A. Vulneraria* L.

"Prunella flore albo" = *P. vulgaris* L. var. *alba* or very doubtfully the *P. laciniata* recently recorded from Cambridge.

"Myrtus Brabantica G. 1414" = *Myrica Gale* L.

"Millefolium aquaticum flo. luteo galericulato Park. 1258" = *Utricularia vulgaris* L.

"Nepeta maior i. Cattaria maior Ger. 782 [683]" = *Nepeta Cataria* L.

"Gnaphalium montanum album Lobelii G. 640, a false figure both in Gerard and Parkinson" = *Antennaria dioica* Gaertn.

"Equisetum fœm. cauda equina G. 1104 P. 1200" = *Hippuris vulgaris* L.

"Anchusa degener and acis milii solis P. 432" ?

"Scordium" = *Teucrium Scordium* L.

"Calamintha montana minor P. 37," probably *Satureia Nepeta* Scheele.

"Lysimachia spicata *cærulea* purpurea G. 476" = *Lythrum Salicaria* L. forma.

"Argemone capitulo oblongo and torulo G. 373" = *Papaver hybridum* L. and *P. Argemone* L.

"Geranium moschatum inodorum G. 645" = *Erodium cicutarium* L'Hér.

"Reseda Plinii G. 277" = *R. lutea* L.

"Cirsium Anglicum G. 1183" = *C. britannicum* Scop.

"Fraxinus Bubula G. 1473" = *Pyrus Aucuparia* Ehrh.

"Melampyrum cristatum wild in our woods, it is not described in Gerard, Parkinson, or Joan. Bauhinum" = *Melampyrum cristatum* L.

"Jacobæa angustifolia Pannonica, ō laciniata P. 668, sed videtur falso describi. Baauino in Pinace p. 131. Jacobæa angustifolia, lanuginosa, ō laciniata montana" = *Senecio paludosus* L. The records for this and the preceding species are the earliest known for Britain.

"Anagallis aquatica rotundifolia G. 620" = *Samolus Valerandi* L.

"Galega i Ruta Capraria" = *Galega officinale* L.

"Aria Theophrasti foliis obtusis Bauhini in Pinace p. 452, found in Sandwich in Kent, not spoken of by Gerard or Park." = *Pyrus Aria* Ehrh. but recorded by Lobel in the *Adversaria* of 1570.

"Salix rosea was found in Kent in the same parish of Sandwich" = *Salix* var.

In the list follow the names of fifty plants—"such as we have in our gardens and can spare"—which include *Herniaria* G. 569, *Papaver corniculata* P. 261 "wild by the sea," *Stachys Fuchsii* G. 1399, *Lamium novæ Angliæ parietariæ facie*, and *Sambucus foliis laciniatis*.

Another sheet from Pamplin's MSS., dated July 23, 1659, is peculiarly interesting in that it includes the names of "John Mapletoft, John Snagge, Mr. John Nid [see Pref. to Ray Cat.], Mr. John Wray [Ray], Mr. Thomas Pockley Francis Willughby Esq. [Ray's Patron], Mr. Peter Courthop of Trinity Colledg in Cambridg., Francis Willugby Esq. of Middleton neere Coleshill in Warwickshire, Sir Francis Willugby's son, Mr. Peter Courthop of Danny in Sussex on this side Lewes."

This writing in not in Corbyn's hand, nor is it written by Ray. The note rather suggests the roll of a club. Corbyn has, however, added the date, which was already entered in the corner, so that the document evidently at one time belonged to him, and it was one he thought it worth while to preserve.

ALGOLOGICAL NOTES.—V.–IX.

By G. S. West, M.A., D.Sc., F.L.S.

(Continued from vol. xlix. p. 89.)

V.—A Diatomaceous Earth from Rhodesia.

A Diatomaceous Earth was forwarded to me for examination from the British Museum which had been collected by Mr. A. J. C. Molyneux near Choma, in North-west Rhodesia. It was a dry deposit of a grey colour, and was obtained from around the orifices of warm and hot siliceous springs.

It consists of a freshwater deposit of recent origin, and one Diatom, *Epithemia Argus* Kütz., was present in great quantity, being the dominant constituent of the deposit. Less conspicuous, but almost equally numerous, were *Rhopalodia gibberula* var. *rupestris* (W. Sm.) Grun. and *R. gibberula* var. *Schweinfurthii* O. Müll.

The matrix in which these more conspicuous Diatoms were embedded contained numerous specimens of the following species:—*Eunotia* sp., *Navicula* (*Diploneis*) *elliptica* Kütz., *N.* (*Pinnularia*) *Legumen* Ehrenb., *N.* (*Pinnularia*) *stauroptera* Grun., *N.* (*Pinnularia*) *viridis* (Nitzsch) Kütz., *Mastogloia Grevillei* W. Sm., *Gomphonema intricatum* Kütz., and *Surirella ovalis* Bréb. var. *ovata* (Kütz.) V. Heurck.

In addition to the above were several other fragmentary Diatoms, including one species of *Nitzschia*.

It is hoped subsequently to publish photographic illustrations of the constituents of this deposit, and also of the Diatomaceous Earth from the Outer Hebrides (see Note II.).

VI.—Some African Algæ.

1. Microcystis ochracea (Brand) Forti, Syll. Myxophy. 1907, p. 86. *Polycystis ochracea* Brand, Algenfl. Würmsees, 1898, p. 200. *Sphinctosiphon polymorphus* G. S. West, "Alg. Third Tanganyika Exped.," Journ. Linn. Soc. Bot. xxxviii. 1907, p. 145, t. 3, f. 12;

t. 5, f. 11–13. When *Sphinctosiphon polymorphus* was described it was stated that "the exact nature of the chromatophore could not be determined from the preserved material. It is undoubtedly massive and occupies most of the cell, being for the greater part parietal in disposition." It was also described as "læte viridi et valde granuloso." Shortly after the description appeared, Ostenfeld * pointed out that the Alga could not very well be a member of the *Palmellaceæ*, but rather belonged to the genus *Microcystis* in the *Chroococcaceæ*. A re-examination of the specimens from Victoria Nyanza has shown that Ostenfeld's suggestion was a correct one. The cells are pale green in colour, and the massive nature of the supposed "chromatophore" is due to the pigment occupying all the cytoplasm external to the central body, exactly as it does in other members of the *Chroococcaceæ*. The large, dark granules are most probably gas vacuoles.

On transferring the Alga to the genus *Microcystis*, one finds that a species was described in 1898 under the name of "*Polycystis ochracea*," which almost exactly fits the African plant. Moreover, it is a plankton-species, and has been recorded from the Wurmsee, in Bavaria, and from Lake Varano, in Italy. It agrees in all its essential characters and in its dimensions. The cells also are described as "dilutissime viridibus, granulis nitentibus insparsis."

There is one point of difference in the gelatinous integuments. In the African plants the outer portions of the envelope were firm and often distinctly lamellose, the outermost lamellæ frequently becoming mucilaginous. However, all things considered, *Sphinctosiphon polymorphus* must be placed as a synonym of *Microcystis ochracea*.

2. SPIRULINA MAJOR Kütz. Crass. trich. 1·7–2 μ. *Hab.* Albert Nyanza.

3. PLECTONEMA WOLLEI Farlow. *Hab.* Albert Nyanza.

Fragmentary material of this Alga is apparently indistinguishable from *Lyngbya majuscula* Harvey.

4. AMPHORA OVALIS Kütz. *Hab.* Albert Nyanza.

5. NAVICULA RHYNCHOCEPHALA Kütz. var. ROSTELLATA (Kütz.) V. Heurck. *Hab.* Albert Nyanza.

6. TETRAEDRON ENORME (Ralfs) Hansg. *Hab.* Albert Nyanza.

I give a figure of one of the stout inflated specimens which appear to be frequent in this lake. (Fig. 1, A.)

7. CRUCIGENIA EMARGINATA (W. & G. S. West) Chodat, Algues Vertes de la Suisse, 1902, p. 207. *Staurogenia emarginata* W. & G. S. West in Trans. Linn. Soc. Bot. ser. 2, v. 1895, p. 81. t. 5, f. 25, 26; Schmidle in Ber. Deutsch. Botan. Ges. xviii. 1900, p. 156. Long. cell. 12·5–14·5 μ; lat. cell. 11–12 μ.

Hab. Lake Alastra, Madagascar.

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* C. H. Ostenfeld, "Phytoplankton aus dem Victoria Nyanza," Engler's Botan. Jahrbüch. xli. 1908, p. 333.

Further comment upon this species has been rendered necessary owing to a statement made by Professor Chodat in 1902. In his *Algues Vertes de la Suisse*, on p. 207, one finds: " Il est difficile de se faire une idée exacte de la place de cette plante dans le système. Les descriptions de West sont le plus souvent trop succintes et ne sont presque jamais accompagnées d'une étude de l'évolution. Est-ce un genre nouveau ? " He also quotes as a reference "*Staurogenia emarginata* West, Freshwater Alg. of Madagascar in Transact. of the Linn. Soc. of Lond. ii. Ser. Bot. vol. v. p. 3." It seems reasonable to suppose from these remarks, taken in conjunction with his erroneous reference, that Professor Chodat had not seen either the published description or the figures of this Alga, and his comment is not only unjust, but scarcely in agreement with fact.*

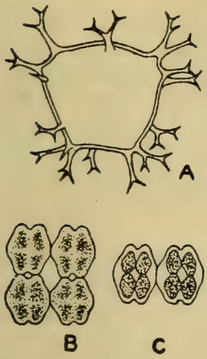

Fig. 1.—A. *Tetraëdron enorme* (Ralfs) Hansg., × 500. B and C. *Crucigenia emarginata* (W. & G. S. West) Chodat, × 520.

The formation of autospores was shown in the original figures in a way which clearly indicates not only the correct systematic position of the Alga, but also that there is only one genus for its reception, viz. *Crucigenia* Morren, 1830 (=*Staurogenia* Kütz., 1849).

It is not necessary to describe the Alga again, as there is nothing to add to the original description, but I give a copy of the original figure for the benefit of those who do not appear to have consulted the one first published (in 1895). Consult fig. 1, B and C.

Moreover, this Alga, which is one of the most remarkable species of the genus, is only known to occur in Madagascar. Yet one finds it, without any comment upon its distribution, in a work on the *Green Algæ of Switzerland*! From the latter publication it has, of course, been copied into Migula's *Kryptogamenflora von Deutschland, Oesterreich, und der Schweiz*, Bd. 5, 1907, p. 661.

8. CŒLASTRUM ROBUSTUM Hantzsch var. CONFERTUM W. & G. S. West, " Welw. Afric. Freshw. Alg.," Journ. Bot. June, 1897, p. 236. Diam. cell. 7–8 μ; diam. colon. 35–38 μ.

Hab. Albert Nyanza.

It is doubtful if *Cœlastrum robustum* is not merely a thick-walled form of *C. microporum*, but the point requires further investigation.

9. CŒLASTRUM CAMBRICUM Arch. var. STUHLMANNI (Schmidle) Ostenfeld in Bull. Mus. Comp. Zool. Harvard Coll, lii. 1909,

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* Remarks in the same volume, accompanied by equally erroneous references, concerning *Tetraëdron pentaëdricum* (which Chodat refers to as "*Tetrapedia pentraëdrica*") and *Tetrapedia morsa* (pp. 219, 220, 222, 223) all indicate that he was unacquainted with the published descriptions and figures of these Algæ. His remarks are based entirely upon misconceptions.

p. 181. *Cœlastrum Stuhlmanni* Schmidle, 1900. Diam. cell. 25–30 μ.

Hab. Albert Nyanza.

I agree with Ostenfeld that it is scarcely possible to separate this form as a distinct species. It differs from *C. cambricum* Arch. (a species which for some unknown reason most French and German authors seem very reluctant to recognize) only in the ridges which radiate from the external projection of each cell. The fact that Ostenfeld has found intermediate stages with the ridges developed in various degrees is almost conclusive evidence that *C. Stuhlmanni* is but an extreme form of *C. cambricum*. It is probably a warm-water form.

10. **Spirogyra angustissima,** sp. n. S. cellulis vegetativis angustissimis, diametro 18–23-plo longioribus, extremitatibus non replicatis; chromatophora singula, angusta, in parte mediana cellulæ locata, marginibus irregulariter undulatis et pyrenoidibus minutis, anfractibus laxis 4½–5. Crass. cell. 4·2–4·5 μ. Cellulæ fructiferæ et zygosporæ ignotæ. (Fig. 2.)

Hab. In swamp, Kota Kota, Lake Nyasa.

It is, as a rule, very undesirable that species of any genus of the *Zygnemaceæ* should be established solely on vegetative characters, but the vegetative filaments of this slender African species differ so much from those of previously described species that it seems advisable to give it a distinctive name. It is much the narrowest species of the genus, being less than half the diameter of the smallest *Spirogyra* previously known. The solitary chromatophore is small and narrow, and occupies only the median third of the cell. It has from 4½ to 5 rather lax spiral twists, and scattered through it at intervals are minute pyrenoids.

One would imagine that the fructiferous cells (female) must be considerably inflated in order to accommodate a zygospore, but these yet remain to be discovered.

The Alga occurred in no. 18 of Dr. Cunnington's numerous collections of the Third Tanganyika Expedition of 1904–5, all of which are in the British Museum. It was found rather sparingly amongst conjugating examples of *Debarya africana* G. S. West.

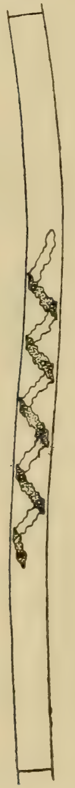

Fig. 2.—*Spirogyra angustissima*, sp. n. Vegetative cell, × 1000.

11. Closterium moniliferum (Bory) Ehrenb. Rather large specimens:—Long. 204 μ; lat. 55 μ; lat. apic. circ. 5 μ.

Hab. Albert Nyanza.

12. Micrasterias Itzigsohnii Braun in Bréb. "Liste Desm. Basse-Normandie," Mem. d. l. soc. imp. des Sci. Nat. Cherbourg, iv. 1856, p. 121, t. 1, f. 2. Long. 56 μ; lat. 61 μ; lat. isthm. 14 μ. (Fig. 3, A.)

Hab. In swamp, Kota Kota, Lake Nyasa.

This small *Micrasterias* agrees more closely with *M. Itzigsohnii* than any other described form. It resembles to some extent *M. incisa* Bréb., 1848, but is without doubt most closely related to *M. truncata* (Corda) Bréb., of which it might perhaps be best to regard it as a small and delicate variety—var. *Itzigsohnii* (Bréb.) nov. comb.—with a tendency to irregularity in the lateral lobulation.*

13. COSMARIUM GRANATUM Bréb. var. SUBGRANATUM Nordst. *Hab.* Albert Nyanza.

14. COSMARIUM SUBCONSTRICTUM Schmidle. *Hab.* Albert Nyanza.

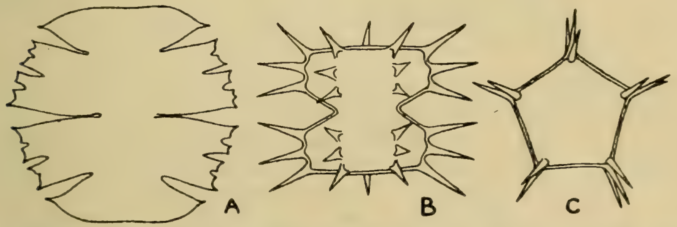

Fig. 3.—A, *Micrasterias truncata* (Corda) Bréb. var. *Itzigsohnii* (Braun) G. S. West (= *M. Itzigsohnii* Braun), × 500. B and C, *Staurastrum tridens-Neptuni* W. & G. S. West, × 500.

15. STAURASTRUM TRIDENS-NEPTUNI W. & G. S. West, "Welw. Afric. Freshw. Alg.," Journ. Bot. 1897, p. 177, t. 369, f. 7. This Desmid was described and figured from specimens obtained by Welwitsch at Huilla in Angola, W. Africa. In working out some of Stuhlmann's East African collections, Schmidle † remarked that it should be placed as a form of *S. subtrifurcatum* W. & G. S. West. It has already been stated ‡ that distinctions from the latter species were fully enumerated at the time *S. tridens-Neptuni* was described. In order to test the validity of the species I have again examined some of the original material, and made further drawings. I find the characters of *S. tridens-Neptuni* very constant, and of such a nature that one cannot regard it as having any close affinity with *S. subtrifurcatum*. The latter has a triangular vertical view, with bluntly rounded angles, whereas the former has a pentagonal vertical view with sharp angles. Both species are provided with three long spines at each angle of the semicell, but in *S. tridens-Neptuni* the spines are stouter and placed vertically over one another in one plane, as compared with the disposition of the spines in a triangle at each blunt angle of *S. subtrifurcatum*. Fig. 3, B and C, represent front and vertical views of *S. tridens-Neptuni*.

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* Bulnheim's forms figured under the name of "*Micrasterias Itzigsohnii*" (cf. *Hedwigia*, ii. 1862, t. 10, I. f. 5) are merely reduction forms of *M. pinnatifida* (Kütz.) Ralfs.

† W. Schmidle in Engler's Botan. Jahrbüch, xxxii. 1903, p. 73.

‡ W. & G. S. West in Ann. Roy. Bot. Gard. Calcutta, vol. vi. part ii. 1907, p. 215.

VII.—ALGÆ FROM QUEENSLAND.

Two small collections of Algæ were examined. The first one was made by Dr. T. L. Bancroft at Beaudesert. It consisted of a mass of vegetative filaments of various genera of Green Algæ, amongst which were other smaller forms, mostly Diatoms.

The vegetative filaments comprised three sterile species of *Spirogyra*, two of *Mougeotia*, and one of *Œdogonium*. Amongst them were *Cosmarium Regnellii* Wille, *Glœocystis gigas* (Kütz.) Lagerh., *Oscillatoria tenuis* Ag., and the following Diatoms:—

Melosira varians Ag., *Synedra Acus* (Kütz.) Grun., *S. Ulna* (Nitzsch) Ehrenb. var. *splendens* (Kütz.) V. H., *Gomphonema Augur* Ehrenb. var. *Gautieri* V. H., *Cocconema lanceolatum* Ehrenb., *C. parvum* W. Sm., *Epithemia turgida* (Ehrenb) Kütz., *Rhopalodia gibba* (Kütz.) O. Müll., and *R. gibberula* (Ehrenb.) O. Müll.

The second collection was made in North Queensland by Mr. F. Muir, of Brockenhurst, early in 1910. There were three tubes, one from a small stream at Mosman, one from a backwater of the Big Mosman River, and one from a backwater of the Little Mosman River. These localities are respectively abbreviated in the following list to "M.," "B. M. R.," and "L. M. R." Several of the Algæ are of considerable interest, and all three tubes contained a rich assortment of Diatoms, one of the most abundant of which was *Desmagonium Rabenhorstianum* Grun.

CHLOROPHYCEÆ.—*Glœocystis gigas* (Kütz.) Lagerh., M. *Ankistrodesmus falcatus* (Corda) Ralfs, B. M. R. *Pediastrum Tetras* (Ehrenb.), Ralfs, M.

Myxonema sp., B. M. R.

Schizomeris Leibleinii Kütz., M.

Gonatozygon Kinahani (Arch.) Rabenh., M., B. M. R. *Cylindrocystis pyramidata* W. & G. S. West, M., B. M. R.

Closterium calosporum Wittr., M. *C. Dianæ* Ehrenb., M. *C. Ehrenbergii* Menegh., M. *C. Leibleinii* Kütz., B. M. R. *C. moniliferum* (Bory) Ehrenb., M. *C. Navicula* (Bréb.) Lütkem., M. *C. parvulum* Näg., M. *C. Venus* Kütz., B. M. R.

Euastrum ansatum Ralfs, two forms from M. and B. M. R.

Micrasterias Möbii (Borge) W. & G. S. West var. *javanica* Gutw.

Cosmarium Lundellii Delp. var. *corruptum* (Turn.) W. & G. S. West, M. and B. M. R. *C. retusiforme* (Wille) Gutw., B. M. R. *C. subcostatum* Nordst. forma *minor* W. & G. S. West, M. *C. subspeciosum* Nordst. var. *simplex*, B. M. R. *C. subtriordinatum* W. & G. S. West var. *rotundatum* Schmidle, M.

Staurastrum Heimerlianum Lütkem. forma, M. *S. margaritaceum* Ehrenb. var. *hirtum* Nordst., B. M. R.

MYXOPHYCEÆ.—*Spirulina princeps* W. & G. S. West, B. M. R. *Phormidium Retzii* (Ag.) Gom., M. *P. molle* (Kütz.) Gom., B. M. R.

BACILLARIEÆ.—The Diatoms recorded were observed from all three localities.

Synedra Ulna (Nitzsch) Ehrenb., and varieties.

Eunotia diodon Ehrenb., *E. formica* Ehrenb., *E. pectinalis*

(Kütz.) Rabenh., *E. lunaris* (Ehrenb.) Grun., *E. flexuosa* Kütz., *Desmagonium Rabenhorstianum* Grun.

Achnanthes crenulata Grun., *A. hungarica* Grun., *Cocconeis Placentula* Ehrenb.

Navicula appendiculata (Ag.) Kütz., *N. gracilis* (Ehrenb.) Kütz., *N. major* Kütz., *N. nobilis* Ehrenb. var. *Dactylus* (Ehrenb.) V. H., *N. stauroptera* Grun., *N. viridis* Kütz., *N. viridula* Kütz., *Stauroneis Phœnicenteron* Ehrenb., *Vanheurckia rhomboides* (Ehrenb.) Bréb. var. *saxonica* (Rabenh.) G. S. West.

Gomphonema gracile Ehrenb. and varieties, *G. tenellum* Kütz., *G. parvulum* Kütz.

Cocconema cymbiforme Ehrenb., *C. læve* (Näg.) G. S. West, *C. leptoceros* Ehrenb., *C. turgida* (Greg.) G. S. West, *C. ventricosa* (Kütz.) G. S. West.

Rhopalodia gibberula (Kütz.) O. Müll.

Nitzschia scalaris (Ehrenb.) W. Sm., *N. Sigma* W. Sm., var.

Surirella biseriata Bréb., *S. linearis* W. Sm. and varieties, *S. ovalis* Bréb. var. *angusta* (Kütz.) V. H.

Of the various species recorded in the above list the following deserve special mention:—

CYLINDROCYSTIS PYRAMIDATA W. & G. S. West. This species is known to occur in Ceylon and Burma. It still requires detailed investigation as to the nature of its cell-wall, as the conjugation rather leads one to suppose that it would be more correctly placed in the genus *Cosmarium*, in which case a good name for it would be "COSMARIUM CYLINDROCYSTIFORME." Long. 31–33 μ; lat. 20–22 μ.

COSMARIUM SUBTRIORDINATUM W. & G. S. West var. ROTUNDATUM Schmidle in Engler's Botan. Jahrbüch. xxvi. 1898, p. 36, t. 2, f. 20, 21. The specimens seen from the small stream at Mosman were very like Schmidle's fig. 21 in outline, but in all cases the granules were as acute as in the type form. The variety differs markedly from the type, however, in its open sinus and more elliptic semicells. Long. 27 μ; lat. 28 μ; lat. isthm. 10 μ; crass. 17 μ.

COSMARIUM SUBSPECIOSUM Nordst. var. SIMPLEX var. n. Var. crenis nudis, tumore basali semicellularum glabro sed rotundato ut in forma typica. Long. 40 μ; lat. 34 μ; lat. isthm. 11 μ; crass. 22 μ.

Hab. Backwater on Big Mosman River, N. Queensland.

This variety is characterized by the entire absence of granules from all the lateral crenations and from the basal tumour of the semicells, but is otherwise similar to the typical form. It bears the same relation to the granulate forms of *C. subspeciosum* as does *C. speciosum* var. *simplex* Nordst. to the more typical forms of *C. speciosum.*

EUASTRUM ANSATUM Ralfs. Two forms of this ubiquitous species were observed:—

a. Forma minor, marginibus lateralibus retusioribus; long.

54 μ; lat. 30 μ; lat. isthm. 9 μ. *Hab.* In small stream, Mosman, N. Queensland.

b. Forma cum undulo singulo in marginibus lateralibus supra et juxta angulum inferiorem rotundatum; long. 90 μ; lat. 47 μ; lat. isthm. 13 μ. *Hab.* Backwater on Big Mosman River, N. Queensland. This form is closely allied to, and probably identical with, var. *pyxidatum* Delp.

The real characters of *E. ansatum* are apparently little understood, in consequence of which this well-known Desmid has been described from tropical and subtropical countries under various new names. The following recently described "species" can only be regarded as forms of *E. ansatum*:—

E. securiformiceps Borge in Arkiv f. Botan. utgifv. af K. Sv. Vet.-Akad. Bd. 1, 1903, p. 112, t. 4, f. 29.

E. rotundum Playfair in Proc. Linn. Soc. N. S. Wales, xxxii. 1907, p. 170, t. 5, f. 20.

E. subansatum Bernard, Prot. et Desmid. Java. Dep. de l'Agric. Ind. Néerland. Batavia, 1908, p. 122, f. 199–201.

E. tropicum Bernard, *op. cit.* p. 123, f. 202, 203.

MICRASTERIAS MÖBII (Borge) W. & G. S. West in Journ. Linn. Soc. Bot. xxxiii. 1897, p. 162; in Botanisk Tidsskrift, 1901, p. 170, t. 3, f. 21.

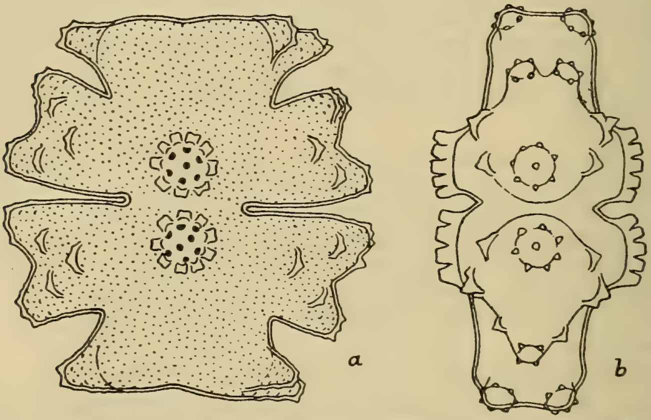

Fig. 4.—*Micrasterias Möbii* (Borge) W. & G. S. West var. *javanica* Gutw., × 500. *a*, front view; *b*, side view of another specimen; note the difference in the lobulation of the two semicells. Mosman, N. Queensland.

Var. JAVANICA Gutw. in Bull. de l'Acad. Sci. Cracovie, Nov. 1902, p. 603, t. 40, f. 58. One of the principal features of this variety, namely, the character of the central protuberance, is entirely omitted from Gutwinski's description, and but feebly indicated in his fig. 58*c*. In typical *Micrasterias Möbii* the central protuberance is rounded and scrobiculate; in var. *javanica* it still retains some of the scrobiculations, but in addition it possesses a ring of rather large verrucæ. The only essential features of var. *javanica* are as follows:—

Semicellulæ cum verruca conica intra basin lobuli lateralis uniuscujusque et verruca conica majori infra incisionem lobi lateralis; tumore centrali prominentiori, cum verrucis rotundatis vel emarginatis circ. 9 ad marginem et in centro scrobiculis conspicuis 7–8. Long. 101–116 μ; lat. 97–105 μ; lat. lob. polar. 66–77 μ; lat. isthm. 31–37 μ; thickness 56–64 μ. (Fig. 4.)

The Queensland specimens were from a small stream at Mosman. They agree with var. *javanica* better than with any other variety of this species. Gutwinski's figures are poor and sketchy, being of the nature of rough studies, so that it is often difficult to reconcile his figures with his descriptions. In the present instance the three accessory tumours (or verrucæ) within each lateral lobe are well described but scarcely discernible in his figures.

Bernard ("Alg. unicell. d'eau douce Malais," Dep. Agric. aux Indes-Néerland. Buitenzorg, 1909) does not discriminate between *Micrasterias Möbii* and *Euastrum turgidum* Wallich, even though it is quite impossible to reconcile *Micrasterias Möbii* * with Wallich's description and figure of *Euastrum turgidum*.† Playfair also (in Proc. Linn. Soc. N. S. Wales, xxxiii. 1908, pp. 610–612 ‡) confuses these two Desmids.

It would appear that *Euastrum turgidum* is a Desmid of the Indo-Malay region, probably very rare, which requires further investigation. I have not yet seen it, but I judge that such a species exists, not merely from Wallich's original account, but also from the somewhat poor figure published by Schmidle of a specimen from Sumatra.

M. Möbii appears to occupy a definite area in the eastern tropics, extending from Singapore to N. Queensland, although, like some other Desmids typical of this area, it has irregular extensions further south in Australia.

Spirulina princeps W. & G. S. West in Trans. Linn. Soc. Bot. ser. 2, vi. March, 1902, p. 205; G. S. West in Journ. Linn. Soc. Bot. xxxviii. 1907, p. 179, t. 9, f. 5. *S. Gomontii* Gutw. in Bull. Acad. Sci. Cracov. Nov. 1902, p. 613, t. 40, f. 69. *S. gigantea* Schmidle in Engler's Bot. Jahrbüch. xxxii. 1903, p. 59, t. 1, f. 5. Crass. trich. 4·5 μ; diam. spir. 11–12 μ. *Hab.* Big Mosman River, Queensland.

The specimens were more elongated than those I have previously examined from Ceylon and Central Africa, and not infrequently suddenly bent.

Achnanthes crenulata Grun. Not uncommon in all three collections, and agreeing well with the description given by Cleve (Synops. Navic. Diat. ii. 1895, p. 195) and the figures in *Le Diatomiste*, vol. i. t. 9, f. 3, 4. It has previously been recorded from Australia, New Guinea, and Samoa.

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* *Vide* Botan. Tidsskrift, 1901, t. 3, f. 21.

† Wallich in Ann. Mag. Nat. Hist. ser. 3, vol. v. 1860, t. 14, f. 17, 18.

‡ From Playfair's remarks on p. 612 he has apparently no conception of the meaning of the term "life-history." His remarks throughout the paper show an inability to appreciate the difference between ontogeny and phylogeny.

Nitzschia scalaris (Ehrenb.) W. Sm. This large species, with its conspicuous markings, was frequent in the collection from the Big Mosman River.

VIII.—Selenastrum acuminatum Lagerheim.

Selenastrum acuminatum Lagerh. in Wittr. & Nordst. Alg. Exsic. 1882, no. 441; in Öfvers. af K. Vet.-Akad. Förh. 1882, no. 2, p. 71, t. 3, f. 27–30.

In his work on the *Algues Vertes de la Suisse*, 1902, p. 211, Chodat has placed *Selenastrum acuminatum* in the genus *Scenedesmus*, an error which is apparently the result of having confused Lagerheim's species with *Scenedesmus obliquus* var. *dimorphus* (Turp.) Rabenh. The figures given by Chodat (*l. c.* p. 166, f. 88) certainly represent the latter, whereas they do not represent *Selenastrum acuminatum*. Unfortunately, those who have too implicitly followed this work of Chodat have repeated the same error. The latest instance of this is by Petersen,* whose figure of "*Scenedesmus acuminatus* (Lagerh.) Chodat" is typical *Scenedesmus obliquus* var. *dimorphus*.

The colonies of *Selenastrum acuminatum* consist of only four cells which easily dissociate. Each cell is lunate or arcuate, and the acute extremities are suddenly drawn out into long points, a character which at once distinguishes this Alga from any form of *Scenedesmus obliquus* (=*Sc. acutus*). In the fully grown cell there is a single chloroplast with a slight excavation at one side, and without a pyrenoid (fig. 5*e*). Occasionally the chloroplast divides into two (fig. 5*g*). Four autospores are formed in each mother-cell by oblique longitudinal divisions. The daughter-cells remain loosely attached for some time, generally in rather an irregular manner, but separate as the cells become adult.

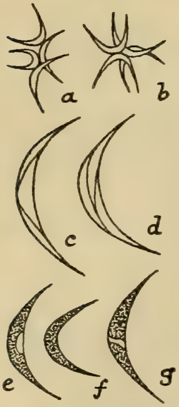

Fig. 5.—*Selenastrum acuminatum* Lagerh. *a* and *b*, typical colonies of four cells; *c–g*, solitary cells.

The Alga was brought to me by Mr. W. B. Grove from a small pond at Olton, Warwickshire, where it occurred in immense quantity from February to May, 1911. It thrived in laboratory cultures from February to July, the best cultures being those in filtered, sterilized water from the pond in which it was originally found.

In a thriving culture the cells attained maturity in about fifteen to twenty days, at the end of which period a good percentage of them produced a new generation of autospores. All the colonies consisted of young cells, the mature cells being invariably free. Thus this species is very closely akin to *Ankistrodesmus*, being a connecting-link between that genus and *Selenastrum*.

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* J. B. Petersen in Botan. Tidsskrift, Bd. xxxi. 1911, p. 171 (fig. 6).

IX.—A New Species of Euastrum.

Euastrum laticolle, sp. n. E. submediocre, circiter 1⅓-plo longius quam latum, profundissime constrictum, sinu angustissimo-lineari; semicellulæ trilobæ, incisuris inter lobas late concavo-excavatis; lobis lateralibus trapeziformibus, angulis superioribus et inferioribus leviter rotundatis, lateribus sursum divergentibus et levissime retusis; lobo polari transverse subrectangulari, angulis vix rotundatis paullo productis, apice convexo sed retuso in medio; in centro semicellularum et prope isthmo tumore parvo instructo. A vertice visæ transverse subhexagono-rectangulares, tumore subconica ad medium utrobique, polis concavis, angulis polaribus duobus rotundatis, lateribus inter tumorem centralem et angulos polares late concavis; lobo polari transverse subrectangulari, angulis subrotundatis et lateribus leviter concavis. Membrana irregulariter et subsparse punctulata. Long. 58 μ; lat. 44 μ; lat. lob. polar. 26 μ; lat. isthm. 10 μ; crass. 30 μ. (Fig. 6.)

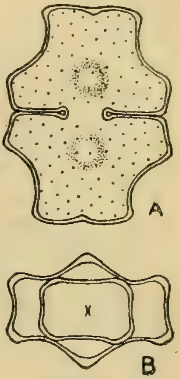

Fig. 6.—*Euastrum laticolle*, sp. n., × 500. A, front view; B, vertical view.

Hab. In a bog at Lindeth, near Bowness, Westmoreland.

This is a very distinctive species, its only near relative being *E. Berlini* Boldt (in Bib. till K. Sv. Vet.-Akad. Handl. Bd. 13, 1888, p. 10, t. 1, f. 12), a Desmid known only from Grönnedal in South Greenland. From this Arctic Desmid *E. laticolle* differs in the form of the front view, having a closed and linear sinus, and lateral lobes of quite a different shape. The general outline of the vertical view is the same as in *E. Berlini*, but in the latter species the polar lobe is described (and also figured) by Boldt as "late elliptico" when seen in end view, whereas that of *E. laticolle* is rectangular with retuse sides and rounded angles.

SPHÆRELLA v. *MYCOSPHÆRELLA*.

By W. B. Grove, M.A.

The genus *Sphærella* was founded by Sommerfelt in 1824 for a group of algæ belonging partly to the *Volvocales*. In 1828, Agardh established the genus *Hæmatococcus*, which included one species of the same group. Again, in 1849, the name *Sphærella* was given by Fries to a subgenus of *Sphæria*, among the Pyrenomycetes, which was afterwards raised by Cesati and de Notaris to the rank of a genus. So long as it was the custom to use *Hæmatococcus* for the algal genus, the name *Sphærella* could be legitimately employed for the fungal one, and over five hundred species have been described under that title. But when the word

Sphærella was resuscitated by algologists under the rules of priority, it became necessary to devise another one for the genus of Pyrenomycetes, and this was done in 1884 by Johanson, who by a happy thought fixed upon the word *Mycosphærella*.

So far, all was plain sailing. But, in 1891, Saccardo (who considered that *Hæmatococcus* was the correct nomenclature for the algal genus, and consequently *Sphærella* for that of the fungi) inadvisedly wrested the word *Mycosphærella* from its original application, and so introduced a confusion which is gradually growing worse. It happens that, among the species included under the Friesian idea of *Sphærella*, there are some whose asci contain eight sporidia, and one at least containing sixteen. It occurred to Saccardo that, since *Mycosphærella* was not required, in his opinion, for the whole group, it might as well be used, "*pro minori parte*," for that which had sixteen spores, and he published it with this restriction in his *Sylloge Fungorum*, vol. ix. p. 659. In this he has been followed by Massee (*Diseases of Cultivated Plants*, p. 215),* but not by Engler and Prantl (*Pflanzenfam.* 1897, i. 1, p. 423). It is obvious that the solution of the difficulty lies with the algologists. Until they have decided which name to use, the mycologist can only wait. Let us then examine the question from their point of view.

This has already been done by Wille (1903), who arrived at the conclusion that the name *Sphærella* should be suppressed among the algæ, and by Hazen (1899) who arrived at the opposite conclusion. The matter was also considered, from the mycological point of view, by Berlese and de Toni (1887), and they arrived at the same conclusion as Wille. But it seems that these latter authors have, unconsciously, misrepresented the exact state of things. The genus *Sphærella*, as founded by Sommerfelt (1824) contained three species, the synonymy of which, according to Wille and Hazen, is as follows:—

1. S. NIVALIS = *Chlamydomonas nivalis* Wille (1903).
2. S. WRANGELII = *Volvox lacustris* Girod (1802).
   = *Hæmatococcus pluvialis* Flotow (1844).
   = *Sphærella lacustris* Wittrock (1888).
3. S. BOTRYOIDES = *Palmella botryoides* Kützing.

The genus *Hæmatococcus* as founded by Agardh (1828) contained also three species:—

1. H. NOLTII = *Euglena sanguinea* Ehrb.
2. H. GREVILLII = *Sphærella lacustris* Wittr.
3. H. SANGUINEUS = *Glœocapsa sanguinea* Kütz.

It will be noticed that the second species in each genus is the same. Of the correctness of the identifications there is, according to the algologists mentioned, not the slightest doubt, and therefore, however curt the original diagnoses may have been, they must be deemed sufficient for the purpose. Both Wille and Berlese and de Toni arrive at their conclusions from other considerations than that of priority—Wille, on the ground that the type of Sommerfelt's genus was *S. nivalis*, and not *S. Wrangelii*, and that he considered it inadvisable to upset the large genus *Chlamydomonas* by renaming it *Sphærella* as should in that case be done—and Berlese and de Toni, on the ground that Sommerfelt's genus was almost still-born,* a conclusion at which they arrive by omitting to take into account his species *S. Wrangelii*, and by preferring to attribute his *S. nivalis* to a later-erected genus *Chlamydococcus* A. Br. (1851). The matter is also confused, in their account of it, by the fact that it was then (and till quite lately) thought that *C. nivalis* and *S. lacustris* were congeneric, which is now known to be a mistake.

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* An instance of the confusion referred to above is seen in this work, where the author, after having defined the genus *Mycosphærella* in Saccardo's restricted sense, proceeds to describe two species under that head, each with only eight spores.

The result is that *Sphærella* must be accepted as an algal generic name, whether for *nivalis* or for *lacustris* it matters not to the mycologists. This leaves the field clear for *Mycosphærella* of Johanson instead of the old *Sphærella* of Fries; but at the same time invalidates Saccardo's use of the name for the sixteen-spored species. Following out the happy idea of Johanson (it would be well if all nomenclators would show as much aptness for their work as he did), I suggest that for the latter group the name *Diplosphærella* be employed, with the following diagnosis:—

DIPLOSPHÆRELLA nov. nom. Perithecia et sporidia ut in *Mycosphærella* Johans., sed ascis sexdecim-sporis.

D. polyspora (Johans.) nov. comb. *Mycosphærella polyspora* Johans. Svampar fran Island (1884), p. 164.

My thanks are due to Professor G. S. West and Mr. J. Ramsbottom for help in connection with the literature concerned in this involved and much debated matter.

Postscriptum.—While the question between *Sphærella* and *Mycosphærella* is not concerned, from the mycological point of view, with the species of alga for which the former is to be employed, it may be as well to seize the occasion to point out that, if the reasoning given above is correct, the species now called *Chlamydomonas nivalis* should bear the name *Sphærella nivalis*, and all the other similar species of *Chlamydomonas* should be transferred to the same genus. Then the other generic name *Hæmatococcus* can be used for "*Sphærella Wrangelii*." The basis for the decision will be seen in the following quotation from Sommerfelt's paper:—

"*Sphærella.*

Char. gen. Vesiculæ gelatinosæ, globosæ, minutissimæ.

1. *Sphærella nivalis*: vesiculis dispersis (in nive), punctiformibus, sanguineis.

2. *Sphærella Wrangelii*: vesiculis in crustam pulverulentam aggregatis (ad rupes inund. calc.), sanguineis. *Lepraria Kermesina* Wrangel, MS.

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* "Distrutto appena sorto," *l.c.* p. 225.

3. *Sphærella botryoides*: vesiculis aggregatis, minutis, viridibus. *Mucor botryoides* L., *Nostoc botr.* Ag., *Palmella botr.* Lgb."

It would, however, be simpler and perhaps equally correct to retain *Chlamydomonas* as now used, and to call the second species *Sphærella lacustris*.

CRITICAL REFERENCES.

Sommerfelt, Om den röde Snee, in Mag. f. Naturvidenskab. (1824), vol. iv. p. 249.

Agardh, Icones Alg. Europ. Nos. 22–4 (1828) (No. 21 is "*Protococcus nivalis*").

Fries, Summa Vegetabil. Scand. (1849), p. 395.

Johanson, Svampar fran Island (1884), p. 163.

Berlese and de Toni, Intorno al Genere *Sphærella*, in Atti Real. Istit. Venez. (1887), ser. 6, vol. v. pt. 1, p. 221.

Saccardo, Sylloge Fungorum (1891), vol. ix. p. 659.

Hazen, The Life History of *Sphærella lacustris*, in Mem. Torr. Bot. Club. (1899), vol. vi. p. 211.

Wille, Algologische Notizen, x. Ueber die Algengattung *Sphærella* Somm., in Nyt Mag. f. Naturvidenskab. (1903), vol. xli. pt. 1, p. 94.

MALVA SYLVESTRIS L.

BY E. ADRIAN WOODRUFFE-PEACOCK, F.L.S.

A CAREFUL study of any given plant should prove useful in suggesting new ways of critically estimating other species. The Common Mallow (*Malva sylvestris*) will prove as good as any.

Mr. S. T. Dunn, in his *Alien Flora*, p. 46, writes of it:—"A native of bushy places and pastures in most parts of Europe, but becoming more and more confined to artificial habitats northwestwards in Europe, and in England not recorded in natural habitats, though common on woodsides and about houses." This does not state half the facts now known, nor place them in their proper perspective. It is a simple matter to test the environment conditions of *M. sylvestris*, which never vary. It demands full sunlight and half shelter from the wind. These two matters must ever be kept in mind in estimating its nativeness; they imply that it is a sylvestral species, a frequenter of bushy places. This, however, is by no means all. It is never found in close or open woods, either in England or abroad, so far as I can learn, because there it would be too much cut off from direct sunlight. In pastures it is found in Lincolnshire but only under exceptional circumstances, *i.e.*, in villages and their immediate neighbourhood when protected by nettles, thistles, thorns, &c., where it cannot be got at by stock; and on roadsides which are slightly or never stocked by cattle it is found abundantly in sunny spots. It apparently flies to man for protection from destructive cattle and sheep. To say it is "more and more confined to artificial habitats" in North-west Europe is to state, in other words, that in our part of the world heavy stocking is the rule, with enclosures full of cattle and sheep, so that there are no *natural habitats* left.

Its first record in the past for England is that of my kind correspondent, Mr. Clement Reid, for Roman Silchester, which could hardly be called "a natural habitat." There is no place known to me in Lincolnshire, nor its seven surrounding counties, in which from soil requirements *M. sylvestris* can grow "in ideal conditions," though it is found in all. In semi-natural habitats, though they also are strictly limited, when the soil is right and unstocked or lightly stocked, it flourishes "like a native." The only unstocked localities I can find are overgrown quarries, churchyards, and the banks of embanked lowland streams. For the Mallow, as for all species of the same requirements, these are practically the only semi-natural habitats left in this highly cultivated county. In meadows and orchards, either in or away from villages, it is quite unknown on account of the mowing and aftermath stocking.

Though it is evidently a lime lover, the Mallow can do with fairly little of this substance, for it is sometimes found on tilth grass-roads on peat, where the soil is rarely or never stocked, where the ruts have been repaired with limestone of various kinds. This is the only compound soil I have found it on, with the exception of old road-mud caps on stone walls, where it flourishes where its enemies cannot reach it. In tilth pure and simple it cannot be expected, being a perennial with highly developed requirements.

The earliest Lincolnshire record for the Mallow is Sibthorp's "In sylvis," 1780. This is as much as saying "in bushy places," for the enclosures had not come then on the chalky boulder clay he referred to. In old quarries, churchyards, and stream banks, it shows the same love of direct sunlight and protection from winds as in villages and along roads, and I have notes of it as a plant five feet high. The white-flowered form is recorded for the Louth neighbourhood, by the Rev. J. H. Thompson,* in the MS. notes of Watson's Top. Bot. in the British Museum. I personally have never met with it. I have full notes on it on thirty-one out of the fifty rock-soils of this county. It will be found on others, for some fifteen are quite untouched yet. It is also distinctly a "light soil" lover, *i.e.*, shows a preference for alluvial soils, decaying limestones, sands and sandy gravels, or the untrodden or light root-soils of old clay lands. I have proof that cattle and sheep are its enemies. On the road side of the hedge it may be the predominant species, though eaten off through the fence as far as the stock can reach; while on the pasture side of the fence not a single plant can be found. Its seeds are water-carried for a considerable distance without hurt. The unfertilized flowers close and hang their heads even at a slight shower of rain; in dull, cloudy, uncertain weather and at night they close, but do not droop except in heavy dews. In both cases the fall may be purely mechanical, corresponding to the weight of the moisture deposited. I have no proof, after careful observations, that the Mallow is ever visited by nocturnal Lepidoptera. My earliest record for flowers, followed by seed, is April 26, 1903; my latest, November 15, 1905; at that date the stamens were still shedding active pollen. It is rich in honey, and is visited early and late in the season by day-flying Lepidoptera, Diptera, Coleoptera, and Thysanoptera. As my hundreds of tubes of visiting insects are not yet all sorted out, or are at present in the hands of specialists, I am in no position to state final results here.

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* **Can anyone give me any facts about this correspondent of Watson?**

M. sylvestris is not like *Ballota nigra*; it does not cling to the old enclosures of villages, to the neglect of semi-natural habitats. It is therefore truly areal, *i. e.*, an indisputable native, in Lincolnshire and the counties round. Though a follower of man, it only seeks his presence for protection from his domesticated stock, which are its worst enemies. It can thrive very well without man's presence, as apparently *Ballota nigra* never does. It takes a place beside *Lamium album* in Lincolnshire, and they have approximately the same frequency.

THE GENUS *SALICORNIA* IN DENMARK.

By C. E. Moss, D.Sc.

Through the kindness of Dr. C. H. Ostenfeld, of the Herbarium of Copenhagen, I have been enabled to examine the collection of Danish *Salicorniæ*.

Judging from the specimens I have thus seen (and all my remarks naturally need this qualification), there are no perennial forms in Denmark. The northern limit of these would appear to occur in Norfolk, where *S. perennis* Mill. (= *S. radicans* Sm.) is very abundant. There is an old record of this species for North Yorkshire, and I should be glad to know if this has received recent confirmation.

However, I have recently discovered or re-discovered a species which is interesting as being in some ways a connecting-link between the annual and perennial forms, and this bridging-species is prominent in the Danish collection. I have seen this species growing abundantly in Hampshire: Messrs. Groves have recently sent me specimens of it from Essex; and Dr. Ostenfeld and Mr. Druce have found it in Ireland. Its occurrence in Ireland is interesting, as this country, like Denmark, appears to be without any perennial Glassworts. I propose to give a fuller account of the plant as soon as I have decided on its botanical name.

Of course, *S. europæa* L. (= *S. herbacea* L.), the most widespread European Glasswort, is abundant in Denmark; and it is interesting to be able to record *S. ramosissima* Woods abundantly in that country. The latter species, I am now able to state occurs also in South-western France, near Archachon (!); in South France, near Marseilles (sp.); and in Moravia (sp.). *S. pusilla* Woods, *S. gracillima* Moss, and *S. disarticulata* Moss, do not appear in the Danish collection. The prostrate forms are also poorly represented, but *S. prostrata* Pall. occurs.

Generally, one's beliefs are confirmed that the perennial forms of the genus are the most southern; that the prostrate herbaceous forms are more southern than the erect ones; and the erect herbaceous forms are more abundantly represented in Southern England than elsewhere.

SHORT NOTES.

Dissected Leaf of Horse-radish (*Armoracia rusticana* Gaertn.).—The remarkable frequency of this form in a dry field near Bognor in August last suggested that it might be correlated with the long spell of dry, hot, sunny weather for which the summer was remarkable. The phenomenon, which is well known in this plant, consists in a reduction of the large surface by the disappearance more or less of the mesophyll between the lateral veins, and suggests an obvious adaptation to a diminished water supply or to atmospheric conditions increasingly favourable to transpiration. Generally several leaves of a plant were affected, diminution of surface increasing in successively younger leaves. I noticed a similar prevalency of the leaf-cutting in plants growing in a small enclosure near home—just off West Hill, Wandsworth. Thinking it might be worth while calling attention to the matter, I showed a specimen at a meeting of the Linnean Society, and as several Fellows have written to me on the subject since, I am writing this note for the Journal. Miss I. M. Roper sent some striking specimens from Bristol, which she says "grew freely on a bank that had been raised at the edge of a damp orchard on cold alluvial soil. Although the drainage would be good on the slope, the situation would never be dry. Observations in another district near Bristol show that the plants on a rubbish-heap are each year much dissected, whilst those close by at the edge of allotment grounds are normal, and on this account I had associated the peculiarity with poverty of soil." Mr. H. S. Thompson also writes that during the last twenty-five years he has occasionally seen such forms in Somerset and elsewhere, particularly on or near the sandhills about Berrow in Somerset; he adds: "I do not happen to have noticed if this form is especially frequent in hot summers." Mr. J. R. Jackson, writing from Lympstone, Devon, says: "I have read with some interest your note to the Linnean on the dissected form of Horse-radish leaf, having had a somewhat similar form in my own garden in the past summer. It occurred on a young plant, probably two years old, the offshoot of an older group which is in a damper and more shady position than the plant bearing the dissected leaves, which, indeed, was close to the edge of a gravel-walk in somewhat impoverished ground, and exposed to the sun nearly all day. This would bear out your suggestion as to the cause being a kind of starvation, for as it was impossible to keep up a sufficient supply of water, scarlet-runners, tomatoes, vegetable marrows and lettuces in the same garden were all killed."—A. B. Rendle.

Plantago setacea Edmonston.—This name is not included in the *Index Kewensis.* It appears in Edmonston's *Flora of Shetland*, p. 17 (1845), and is printed as follows:—

"*Plantago setacea.*

"I have given this name provisionally to a plant not uncommon in mountainous districts, which has hitherto been confounded with *P. maritima.* The characters I would propose are the following:—

"*P. maritima.*

"Leaves erect, narrow lanceolate, smooth; spikes cylindrical.

"*β. dentata.* Leaves toothed.

"*P. setacea.*

"Leaves lying flat on the ground, cylindrical or semi-cylindrical. Spikes globular.

"*β. lanosa.* Base of the leaves woolly.

"Whether these characters are constant, or whether they are of sufficient importance to constitute specific difference, must be left to future observations."

The plant is entirely omitted from the second edition "edited and revised by C. F. Argyll Saxby" (a nephew of Edmonston) (1903)—an unsatisfactory work owing to the omissions of numerous notes such as the foregoing, which represented Edmonston's observations. It is no doubt a form of *P. maritima*; Beeby (in *Scottish Naturalist*, 1887, p. 28) referred the var. *lanosa* to *P. maritima* var. *hirsuta* Syme, as to which see p. 214 of the same volume.—James Britten.

Sagina nodosa var. monilifera Lange.—In the notice (p. 72) of Mr. Druce's account of the International Phytogeographical Excursion in the British Isles there is a slight error with regard to *Sagina.* The new variety or forma pointed out by Professor Massart on the dune-marshes near Southport is *S. nodosa* var. *monilifera.* The interesting account of *S. nodosa* recently given in this Journal (p. 270, 1910) by Mr. Travis refers to this form. *S. glabra*, however, is Mr. Druce's determination of a plant gathered on Ben Lawers.—C. E. Moss.

Ulmus Plotii.—Mr. Druce sends us a reprint of a paper published in the December number of the *Journal* of the Northamptonshire Field Club on *Ulmus Plotii*, an elm to which he has already called attention in the *Gardeners' Chronicle.* The tree "was first distinguished" by Plot in his *Natural History of Oxfordshire* (1677), and is diagnosed by Mr. Druce as "arbor elevata, cortice glabro, ramis attenuatis, foliis parvis, angustis, acuminatis, glabris." It will be observed that no fruit-characters are indicated, nor does it appear from the detailed description in English that fruit has been seen. The tree appears to be widely distributed, and is the *Ulmus sativus* var. *Lockii* of Mr. Druce's *List*. This latter name, by the way, presents certain difficulties. Mr. Druce tells us that the name *Lockii* was given by him because in the area of its growth it is "called Lock's elm, a name I am told which refers to the timber, not to a man's name connected with" the tree. This probably refers to some use of the timber in connection with locks: but in that case can "Lockii" be quoted, even in synonymy? The paper is accompanied by two figures of the tree.

ALLIUM SPHÆROCEPHALUM L. (p. 64).—In 1906 I brought home two bulbs from Jersey. One of these was planted in a rockery among blocks of limestone, the other in garden loam. Each year they have flowered freely, and have increased by bulb division: but in neither case have any head-bulbils appeared, nor have I obtained ripe seed. I suppose there is no chance of Mr. Hunnybun's plant being a hybrid? The development of the young plants of *A. sphærocephalum* is different from that of *A. vineale*.—G. C. DRUCE.

REVIEWS.

Anleitung zur Bestimmung der Karbonpflanzen West-Europas. By Dr. W. J. JONGMANS. Band i. Pp. 482, 390 figs. Craz and Gerlach (J. Stettner), Freiberg in Sachsen. 15 Marks.

THERE can be few of those who have worked at the task of identifying fossil plants from the Coal Measures who have not wished for a systematic flora of such plants. The original descriptions and illustrations are usually scattered in a hundred different publications, many of them difficult to procure; the synonomy is often so puzzling and the characters regarded by authors as specific are so varied that the task of identification becomes extremely difficult to anyone who has not made a special study of the subject.

It is obvious, therefore, that the work which Dr. Jongmans has undertaken is of great utility to those botanists and geologists who wish to collect and study the carboniferous plants of Western Europe. We are now to have for the first time a systematic flora with analytical keys. The present volume deals with the *Thallophyta*, of which our knowledge is very fragmentary, the *Equisetales*, which form one of the most important constituents of the carboniferous flora, and the *Sphenophyllales*, an interesting group long extinct but with probable relations in the modern *Psilotum* and *Tmesipteris*. The various genera and species of these groups are treated in considerable detail, and the descriptions are supplemented with an abundance of excellent illustrations, usually photographs or reproductions of the original figures.

The original plan of giving separate generic, and sometimes even specific, names to different parts of the same plant when found as separate fossils is adopted, but reference is given to the other parts when these are known. It is evident that much remains to be done in the direction of linking up isolated fragments of stems, leaves, cones, &c., into complete plants.

When one looks at a book like the present volume, the richness and variety of even a small part of the flora of the ancient Carboniferous Period strikes one very forcibly. It is greatly to be regretted, however, that the author found himself unable to include in his work an account of the petrified specimens showing the structure of the plants whose external form is exhaustively dealt with. It is true that some references are given to the literature of this subject, but many more are desirable.

A more serious drawback is that the book does not contain more critical work. One can easily realize the enormous difficulties in the way of a really critical account, as the author points out, but it would have added greatly to the value of the work if such a thing had been possible.

Dr. Jongmans knows how to make a book. The various sections are clearly arranged, and a good bibliography and index are provided. One can only marvel at his energy and patience in undertaking a work of such great magnitude, and if the other parts are as good as the present appears to be, he will earn the gratitude of many generations of palæobotanists.

H. H. T.

Das Phytoplankton des Süsswassers mit besonderer Berücksichtigung des Vierwaldstättersees. By Dr. Hans Bachmann. Pp. 213. 15 plates. Jena: Gustav Fischer. 1911. Price 5 Marks.

This volume is an attempted summary of our present knowledge of freshwater phytoplankton, with a passing reference to that which occurs in the Lake of Lucerne. The greater part of the work (about 170 pages) is devoted to a general systematic and biological account of the flagellate and algal constituents of the plankton. Some of these groups, such as the *Flagellata*, *Peridineæ*, and *Myxophyceæ*, are treated very well, the systematic account being based upon the recent work of Lemmermann.

Ceratium hirundinella receives a more comprehensive treatment than has yet been accorded to it, but even this detailed account omits all mention of that peculiar form with the deflexed antapical horn which, so far as is known, occurs only in the lakes of the Outer Hebrides and the West of Ireland.

The treatment of the Diatoms is, on the whole, good, but the complete omission of the genus *Surirella* is a serious defect, when one considers the great abundance of species of this genus in the lakes of the British area, and in the large African lakes.

The *Desmidiaceæ* are only briefly mentioned as plankton-constituents, whereas their treatment should have been much fuller. No group of Green Algæ contains so many exclusive plankton-species and varieties as the *Desmidiaceæ*, and, moreover, they are (with the exception of a few species of *Surirella* omitted from this work), the only constituents which give the freshwater plankton a definite geographical character. This brief mention of plankton-Desmids is in great contrast to the more extended treatment of many genera of the *Protococcales*, which are only casual plankton-units.

One of the best parts of the work is that which deals with the methods of collection, the apparatus used for this purpose, and the quantitative estimation of results. The text-figures are all good, but the plates are rather poor.

G. S. West.

A Short Flora of Cambridgeshire chiefly from an Ecological Standpoint, with a History of its chief Botanists. By A. H. Evans, M.A. The Lower Cryptogams by the Rev. P. G. M. Rhodes, M.A., G. S. West, M.A., D.Sc., F.L.S., and F. T. Brooks, M.A. (*Proceedings of the Cambridge Philosophical Society*, vol. xvi. part 3.) Cambridge: at the University Press. 8vo, wrapper, pp. 197–284. December, 1911. [Price not stated.]

In this carefully executed pamphlet of less than a hundred pages, something like a new type of local flora is set up. The work is divided into various sections: the first deals with Cambridgeshire Botanists; the second with "the physical features of Cambridgeshire, with its geological formations and their attendant Flora"; the third is an "annotated List of some of the rarer plants, many of which are now extinct"; the fourth, which occupies the remainder of the book, being a "general list of species." In this the distribution of the Angiosperms and Pteridophyta through the districts of Babington's *Flora* is indicated but definite localities are rarely given. The Cryptogams are treated more fully in this respect: the *Characeæ* have been revived by the Messrs. Groves; the Algæ are very fully dealt with by Dr. G. S. West, with descriptive and critical notes and full localities; of the Fungi Mr. F. T. Brooks gives only a list and Mr. Rhodes does the same for the lichens.

The chief interest of the book lies in the three first sections. That on Cambridgeshire botanists might have been more informing without appreciably adding to the space it occupies: for example, by adopting the plan now so generally followed of giving the dates of birth and death after the name of each person cited; it is however carefully done. In the second section the ecological aspect of the flora is set forth; it concludes with the following summary regarding the plants stated in Babington's *Flora* to be lost to or unknown in the county:—

"Of the plants reported to be lost, the following are still to be found: *Thlaspi arvense*, *Geranium rotundifolium*, *Lathyrus Nissolia*, *Pyrus torminalis*, *Sedum Telephium*, *S. album*, *Lactuca saligna*, *Senecio viscosus*, *Beta maritima*, *Polygonum minus*, *Salix purpurea*, *Colchicum autumnale*, *Setaria viridis*, *Phleum arenarium*; of those said to be probably extirpated we still have *Myosurus minimus*, *Œnanthe silaifolia*, *Kentranthus ruber*, *Limosella aquatica*, *Veronica spicata*, *Myrica Gale*, and *Liparis Loeselii*. On the other hand, many species—*Senecio paludosus* in particular—have not been seen for a considerable period.

"Of plants said to be unknown in the county we have *Lychnis dioica*, *Digitalis purpurea*, *Festuca duriuscula*, *Tragopogon pratense*, *Epilobium angustifolium*, *Lepidium Smithii*, *Zostera marina* c. *angustifolia*, *Cardamine amara*, *Sagina maritima* d. *densa*, *Quercus sessiliflora*, *Teesdalia nudicalis*, *Vicia lathyroides*, and possibly *Anagallis fœmina*."

The annotated list of some of the rarer plants is very well done, and may be taken as a model of how the subject should be treated. Here again, however, it would have been well if the date had been added after each reference as it is after some. The seventeenth century record of *Pinguicula lusitanica* for the county contained in Herb. Sloane xxvii. (f. 144), which was published in this Journal for 1909 (p. 101), seems to have escaped Mr. Evans's notice. A trifling correction may be made on p. 213; the British Museum specimen of *Limonium reticulatum* is marked "Jas.," not "T.," Sowerby. It would, we think, be well in these days of conflicting nomenclature to indicate in such works as this exactly which list or book has been followed. We note with pleasure that casuals of the kind which disfigure and increase the bulk of some recent floras without adding to their value find no place in Mr. Evans's list.

Etudes sur le Flore des Districts des Bangala et de l'Ubangi. Plantæ Thonnerianæ Congolenses. Série ii. Par E. de Wildeman. Introduction par M. Fr. Thonner. 8vo, pp. xvii, 443; with frontispiece, map, figures in text, and 20 plates. Brussels: Misch & Thron. 1911. Price 11*s*.

This volume adds another to the series of admirably got-up and lavishly illustrated works on the botany of the Congo district which is owed to Dr. de Wildeman. The present publication is a continuation of the *Plantæ Thonnerianæ Congolenses*, 1re Série, by the same author and the late Th. Durand, which appeared in 1900, and which embodied an account of the results of M. Thonner's first botanical trip in this region in 1896. The volume now issued contains, in addition to a systematic description of the plants collected on the second journey, a general account of the district and its flora.

In his introduction M. Thonner describes the route taken on his two expeditions and some of the general botanical characters of the region traversed. This comprises the area between the

Congo and its tributary the Ubangi, the southern portion of which is the country of the Bangala and the northern that of the Ubangi; both are bounded on the east by the district of the Uele. An excellent map, based on M. Thonner's observations, shows the general geographical characters and relations of these areas.

Dr. de Wildeman devotes the first part of the subject-matter to a description of the vegetation of the area, based largely on information supplied by M. Thonner. This is considered under two heads, namely, the central forest zone or the damp equatorial forest region, and the northern zone or the North Congo "brousse." A list of the plants known from each district is given, and this is followed by an elaborate comparative table of the floras of the Central African province (the zone of the Ubangi and the Uele) and of the Bangala district. Apart from the value of the comparative survey, this list forms a useful sweeping together of the plants from the whole area. This section of the book closes with a discussion of the distribution of various seed plants and the part played by these formations in the building up of the Congo flora.

The second section comprises an enumeration of the plants collected on the second expedition (1909); the new species are illustrated by plates. It concludes with separate lists of the plants collected on the two expeditions. The third and last section is a flora of the political districts of the Bangala and Ubangi, compiled from available sources of information, including besides Thonner's plants those collected by the Laurents, Dewèvre, Pynaert, Malchair, and others.

The review of the volume suggests a somewhat bewildering multiplicity of lists which in practice has involved a good deal of repetition, and which somewhat discounts the value of the book to the botanist who is working at this portion of the West African flora. Dr. de Wildeman has brought together a great deal of useful matter and has made a valuable addition to our knowledge of the botany of the Congo region; but some condensation and rearrangement would have made the book a better working tool for the systematic botanist. An important feature is the series of plates, most of which are double-page, illustrating the novelties described in the text. If all descriptive works involving new species were as freely and as clearly illustrated, the task of the systematist would be much lightened.

A. B. R.

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on Jan. 18, Dr. A. Anstruther Lawson gave a lantern lecture entitled "Some features of the Marine Flora at St. Andrews," showing the wealth of algal vegetation at that part of the coast, and its special characteristics, including the habit of the plants when growing in their natural position under water. Illustrations of the gigantic brown algæ of the Pacific Coast were also shown for comparison. The lecture was discussed by Miss A. L. Smith, Mr. J. C. Shenstone, Prof. F. E. Fritsch, Mr. A. D. Cotton, and the President, the lecturer replying to various questions.

At the meeting of the Linnean Society on Feb. 1, Dr. B. D. Jackson communicated some additional information concerning Linné's Lapland Drum. The information printed in the *Proceedings* for last year (pp. 60–61) represented the ascertained facts up to the Bicentenary of Linné in May, 1907. But enquiry was afterwards made as to what had become of the Linnean drum, and it resulted in the discovery of its history as follows:—The drum formed part of a large collection of curiosities which was bought by the Univerity of Upsala in 1832, on the death of Thunberg's pupil and botanical demonstator, C. P. Forsberg. In 1874 the University presented it, not knowing its interesting history, to the Royal Academy of Science, Stockholm, whence, in 1883, it passed to the Trocadéro Museum, in Paris, in exchange for some Peruvian curiosities. It now seems certain that Linné received the magic drum from Pite or Lule Lappmark, as it agrees with the design of others from those parts, and differs from the form of those from Kimi and Torne Lappmark; it has certain figures used in the district of Asele. We may expect a detailed account of the drum in question from Dr. Reuterskiöld, who is occupied in an exhaustive review of all known specimens.

The first number of the *Scottish Botanical Review*, with which we see the Transactions of the Botanical Society of Edinburgh are now united, is nicely printed; among its contents are the first portion of a paper on "The Geological Relations of Stable and Migratory Plant Formations," by Mr. C. B. Crampton, and articles on "Some Aquatic Forms and Aquatic Species of the British Flora, and on *Carex helvola*," by Mr. Arthur Bennett; on "Some Modern Aspects of Applied Botany," by Mr. A. W. Borthwick; and on "Ecological Terminology as applied to Marine Algæ," by Mr. N. M. Johnson. There are also notes and reviews, among the latter a critical notice of Major Wolley-Dod's List of British Roses, issued in last year's Journal, which we may safely attribute to Mr. W. Barclay, though it is not signed.

The *Journal of the Linnean Society* (Botany, no. 274, concluding vol. xxxix., issued Nov. 30) contains a "Supplementary List of Chinese Flowering Plants, 1904–1910," the extent of which shows how greatly our knowledge of the flora of China has extended during that period. We note that the names have not been revised in accordance with the Vienna recommendations: thus on p. 503, at which we opened, we have "Cavalerii" and "Cavaleriei" (the latter being correct); "volkameriæfolia" for "volkameriifolia"; and, stranger still, "Uraria lacei" and "Veronica Maritima." The proofs seem to have not been very carefully read: we note such names as "Tabernæmontana Cum*m*ingiana" (p. 499) and such citations as "Collet" (*ib.*). There are occasionally (when necessary) new names—*e. g.* "Symplocos Ernesti *Dunn* (nom. nov.): *S. Wilsoni* Brand non Hemsl."—and reductions. We are not convinced as to the desirability of the method of citing periodicals which is becoming general—*i. e.* by the insertion of the date of publication after the volume and before the page: thus "Journ. Linn. Soc. Bot. xxxiii. (1897) 88." This is right when the volume is co-extensive with the year of publication, as is the case with this Journal, but in the case of the Linnean Society's Journals, the volumes of which usually extend over two or more years, it seems to us that for the sake of accuracy in such cases and for that of uniformity in others, it is better to adhere to the earlier practice and to place the date at the end of the citation.

There is evidently room for a good proof-reader in Edinburgh. The recent part (vol. xxiv. pt. 3) of the *Transactions of the Botanical Society* contains obituary notices of George Stabler and Robert Pantling, who appear respectively as "Stables" (with a genus *Stablesia*) and "Panthing"; and a paper of three pages in No. 22 of the *Notes* from the Edinburgh Garden speaks throughout of "Mr. A. Bennet (meaning Bennett) and of Rev. M. J. "Berkley" (Berkeley), Rev. O. M. "Fieldon" (Feilden) and "bee" (bees).

Messrs. Crosby Lockwood & Son send us a handy little pocket volume "compiled from the most reliable and modern sources by Frank Braham, F.R.G.S.," entitled *The Rubber-Planter's Notebook* (2*s.* 6*d.* net). It is described as "a handy book of reference on Para Rubber planting, with hints on the maintenance of health in the tropics and other general information of utility to the rubber planter, specially designed for use in the field," and this sufficiently characterizes its scope. It is nicely printed and suitably illustrated.

An important addition to the "Who's Who" class of book is made by Messrs. Churchill in *Who's Who in Science* (*International*) (pp. xvi, 323, price 6*s.* net), edited by Mr. H. H. Stephenson. It is excellently printed, in double columns, and, so far as we have tested it, sufficiently full and accurate. We do not understand the principle which has guided the compiler in his selection, but this on the whole is well made, though we miss certain names which we should have expected to find. We have noticed very few slips: one such is the "Life of William" attributed to Dr. Daydon Jackson—*i. e.* William Turner. The volume is a useful addition to our works of reference.

Messrs. Macmillan have published what is evidently an exceedingly complete and useful book on *Spices* (pp. viii, 449, price 8*s.* 6*d.* net) from the pen of Mr. H. N. Ridley, whose practical experience extending over a long period of years as Director of the Botanic Gardens of the Straits Settlements has enabled him to write with authority upon the subject. The volume includes chapters on Vanilla, Nutmegs and Mace, Cloves, Pimento or Allspice, Cinnamon, Cassia Bark, Black Pepper, Long Pepper, Grains of Paradise, Cardamoms, Capsicums or Chilies, Coriander, Dill, and Cumin, Ginger, and Turmeric and its allies. The book is intended primarily for the cultivator, and the botanical portion, although sufficient for practical purposes, is naturally subordinated to matters connected with the cultivation of the various plants and the various insect and vegetable "pests" which affect this. A useful bibliography is appended to each chapter, and there are a few illustrations, hardly as good as we should have expected to find in so important a book. The volume is well printed, and forms an important contribution to the literature of economic botany.

THE last issue (vol. xi. no. 276) of the *Journal of the Linnean Society* (*Botany*), published on Feb. 1, contains papers on the comparative anatomy of the leaves of certain New Zealand species of *Veronica*, by R. S. Adamson, who also contributes an exhaustive ecological study of a Cambridgeshire woodland; an interesting account, with illustrations, by Miss S. M. Baker of two brown seaweeds of the salt marshes at Blakeney Point, Norfolk—*Pelvetia canaliculata*, of which two new varieties are described and figured, and *Fucus volubilis*, with a new variety; and an account by Prof. Fritsch of freshwater Algæ collected in the South Orkneys by Mr. R. N. Rudmose Brown, including a new genus, *Scotiella*.

A NOTEWORTHY addition to British Moss literature is *The Hepatics of Sussex*, by Mr. W. E. Nicholson (*Hastings and East Sussex Naturalist*, vol. i. no. 6, June 30, 1911, pp. 243–292, 6 plates). Mr. Nicholson is well known to readers of this Journal for the bryological rarities which he has discovered both here and abroad. In rendering an account of the hepatics of Sussex he has given us much more than a mere county list. Among the one hundred and twenty-four species enumerated he includes twenty-one which have been added to the British Flora since the appearance of Mr. W. H. Pearson's book in 1902; and for most of these he has adapted diagnoses from foreign sources not easily available to British botanists. The critical annotations appended to some of the species are of great assistance; and the introductory sketch of the morphology, reproduction, and local distribution, forms a valuable addition to a paper, the primary purpose of which is systematic. The excellent illustrations provided are reproduced from original drawings by the Rev. H. G. Jameson, and represent the additions to the flora.—A. G.

PART 10 of the *Clare Island Survey*, in course of publication by the Royal Irish Academy (Nov. 1911, price 4*s*.), is devoted to a consideration of the Phanerogamia and Pteridophyta by Mr. Lloyd Praeger. It is, as one might anticipate, a very thorough and scholarly piece of work, describing the vegetation of the island in its various aspects of maritime, meadowland, woodland, moorland and alpine, with a complete list of the species with notes on the more interesting. The influence of man upon the flora, and its origin from transport by wind and water as well as by birds, are considered; a full bibliography and excellent index conclude the paper, which is illustrated by five plates and a map.

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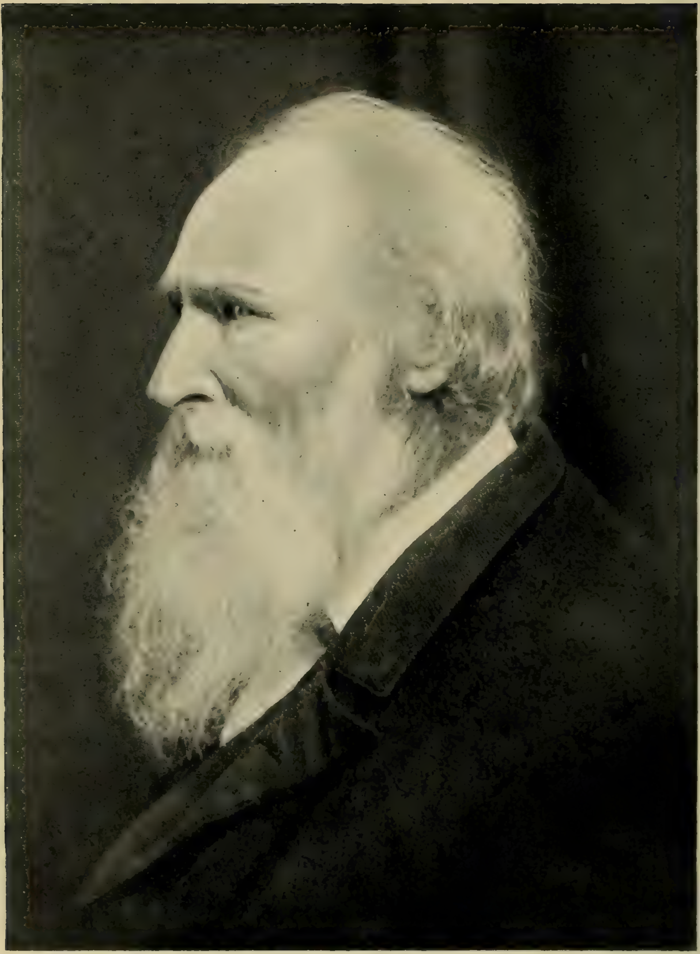

ALFRED FRYER

ALFRED FRYER.

(1826–1912.)

(WITH PORTRAIT.)

British botanists will have learnt with the greatest regret that Alfred Fryer died at his residence at Chatteris, in Cambridgeshire, on February 26th, in his eighty-sixth year.

Living quietly for the greater part of his life in a small country place, few but his most intimate friends were aware of the depth of his intellect or appreciated at their full worth his literary and scientific attainments. To take only one instance, few persons can read with ease French, German, Dutch, and Latin, with the addition of a little Swedish or Danish; such knowledge is especially useful to the botanist in England who has to study, and make comparisons with, foreign forms of plants. But what impressed his friends most deeply, when he was in the prime of life, was his wonderful enthusiasm for any pursuit he took up, and in another direction his marvellous fund of anecdotes connected with the men of the Fens, with whom he always identified himself. What Fryer might have accomplished with a very slight change of Fortune's wheel it is impossible to say; he witnessed many phases of life both in London and the country, made the acquaintance of many men of eminence in different lines, and in his younger days had many advantages; but, in spite of his enthusiasm, he was of a modest and retiring nature, and never could bring himself to make full use of opportunities as a more pushing man would have done.

The Fryers are an old Cambridgeshire family of the northern fenland, and the branch to which Alfred belonged has been resident for at least three hundred years in the Chatteris district; his father was a gentleman-farmer of considerable means, who did not consider it necessary to bring up his son to any regular profession, but allowed him to follow the bent of his natural tastes. Eventually this proved unfortunate, as the son did not inherit any portion of his father's capital, as it was supposed he would be provided for by a rich aunt. The aunt, at her death, was found to have left her money elsewhere, and Alfred was thrown almost entirely on his own resources.

Born on Christmas Day, 1826, he was sent to school at Leicester in or before the year 1840, and there, among others, met a dreamy clever boy of the name of Bates, who was afterwards to become the celebrated traveller and explorer of the Amazon. The two boys became very intimate, and they soon proved themselves to be more devoted to natural history and poetry than to school work; their love for the former subject was no doubt stimulated by the fact that they made the acquaintance of Alfred Russel Wallace, who doubtless even then showed signs of the talent strikingly brought to light by his joint paper with Charles Darwin on the *Origin of Species*. When Bates subsequently left

England for South America he urged Fryer to accompany him, but family considerations did not permit the latter to accept the offer, as he had just lost his first wife.

Circumstances took a decided change when, about 1846 or 1847, he became acquainted with a new circle of friends in London, including some belonging to the Pre-Raphaelite Brotherhood. It does not seem that he saw much of Holman Hunt or Millais, but he was very intimate with the Rossettis and still more with Coventry Patmore, in one of whose letters he is referred to as "a noble fellow and will be much nobler." His poetical tendencies received much encouragement under these auspices, and it seems that he thought of publishing a book of his own verses. Nor was the advantage on his side alone, for he always claimed the credit of inducing Dante Rossetti—who had then only contributed to *The Germ*, the periodical of the Brotherhood—to turn his attention to poetry rather than to painting. Rossetti and Keats seem to have been Fryer's favourite authors, with Browning and perhaps Tennyson next in order; towards the end of his life, however, he changed his ideas a little, and often said that Shakespeare was above them all. These London friendships continued for a time after Fryer returned to Cambridgeshire; but even that with Patmore lapsed when the poet became a Roman Catholic, or a little later.

The life of Patmore by Mr. Basil Champneys contains many letters from and references to Fryer, who was invited to contribute his reminiscences to it: but he says, writing to one of us at the end of 1899: "I refused any help of the kind; Coventry laid his soul fairly open to me—we had little hid from each other—but I have no right to let the public share his confidences to me. We were closer than ordinary friends, almost or quite as close as brothers. He had great natural gifts as a poet and might have been one of our great ones if he had been true to his first impulses."

Fryer was always ready to talk and to write to appreciative friends and correspondents on matters relating to literature: the letter just quoted continues:—

> "Dante Rossetti was true, and his name will grow bigger year by year. Have you ever noticed how *Catholic* his inspiration is? Without the influence of your Church he would never have been quite what he was in *form*. I rank him as only a little less than Shakespeare and Keats in natural inspiration, though, like the latter, there was not a full outcome of the innate power.
>
> "Looking over old letters to destroy them, now my life is near its end, I find an invitation to a meeting of the 'P. R. B.'—a 'set' I would have liked had occasion permitted. Dante Rossetti introduced me to several of them on the sole occasion I saw him at his own house. He was bigger than either his poetry or his less excellent painting, and I regret that I did not keep up the friendship that promised so well."

The next, and to our readers the most important, stage of Fryer's life begins about 1848, when we find him finally settled down in his native district, and turning his whole attention to science. His energy was remarkable, and his physical powers quite exceptional during his whole life, in proof of which we may mention the distances that he covered while exploring on foot the greater part of the Cambridgeshire Fens, and the fact that after taking up his residence in his freehold house at Chatteris he cultivated the large garden attached to it, and managed long ranges of glass for fruit-growing almost entirely with his own hands.

At first he seems to have been chiefly attracted by ornithology, entomology, and conchology, as there are manuscript lists in his writing of the local birds, butterflies, and fossils; while he continued to take a special interest in the first of these subjects till the day of his death. It is not clear at what period he turned his attention to botany, but from the absence of any reference to him in Babington's *Flora of Cambridgeshire* we may conclude it was after 1860—the date of the publication of that work. His first contribution to this Journal was a short note on *Carex distans* in Huntingdonshire (Journ. Bot. 1883, 246), which is interesting as showing that he was then in correspondence with Babington and Messrs. J. G. Baker and Arthur Bennett. In the *Memorials* of the first-named are several letters to Fryer, the earliest, written in 1876, in which Babington acknowledges a list of plants for District vii. of the *Flora of Cambridgeshire*; an appreciation of Babington by Fryer, who met him on the occasion of his rare visits to the Cambridge Herbarium, occurs on p. xlviii. of the same work. In 1883 Fryer was contemplating a Flora of Huntingdonshire and his name occurs as a correspondent of H. C. Watson for that county and for Cambridgeshire in the second edition of *Topographical Botany* (1883, p. 575); his interesting published notes, until his attention became absorbed in *Potamogeton*, mainly related to these counties, and showed an intimate knowledge both of the plants and their habitats.

At the time of the publication of the note above referred to Fryer was already in correspondence not only with the botanists already mentioned but with others—notably the Messrs. Groves, with whom he contracted a warm friendship and who accompanied him on various expeditions in the Fens. His communication to this Journal was the beginning of an intimate correspondence with its Editor, which continued with warmth though not without interruptions until within a few weeks of his death. A little later he enlarged his circle of friends to include Mr. G. C. Druce, of Oxford, the discoverer of his *Potamogeton Drucei*, while Dr. Moss, of the Cambridge Botany School, and Mr. Hunnybun, of Huntingdon, were subsequently added to the list. A. H. Evans first knew Fryer about 1880, and did much work with him in the field.

The first of Fryer's long and valuable series of communications on the genus with which his name is chiefly associated appeared in this Journal for 1886 (p. 306); his growth of the plants for the purpose of study began (as we learn from the note) at least two years before this. At that period (1884) he was already sending living plants to Mr. Arthur Bennett, an acknowledged authority on the genus, whose help he always greatly valued and who refers to Fryer (Bot. Exch. Club Report for 1884, p. 111) as his "acute friend," and quotes from his observations. The many forms of *Potamogeton* which grew about Chatteris, some of which could not be determined from any existing manual of British botany, no doubt in the first instance led Fryer to specialize on the genus, the general flora of the district having been sufficiently examined. He became more and more interested in the genus, and finally devoted himself entirely to it, growing many species in his tanks and watching their development both in his garden and in their native haunts at different times of the year. He corresponded with all the best foreign authorities on the genus, and was an especially valued correspondent of Dr. Morong, the American *Potamogeton* specialist.

From this time until 1899 the pages of this Journal bear ample testimony to the enthusiasm with which Fryer prosecuted his investigations, in recognition of which the Linnean Society in 1897 elected him an Associate. He was fortunate in finding in Robert Morgan, who until his death in 1900 drew most of the plates for this Journal, a collaborator who shared his interest in "Pots."—his pet diminutive for his favourite plants. Fryer's warm and well deserved tribute to Morgan's work will be found in Journ. Bot. 1900, 490; it was in conjunction with Morgan as artist that he produced the fine quarto work, *The Potamogetons of the British Isles*, of which the first instalment appeared in 1898, and which occupied the remainder of his life, remaining, unfortunately for science, incomplete at his death. A notice of the book was given in this Journal for 1898, p. 354; it enters elaborately into questions relating to the species, varieties, forms, and hybrids of the genus, and is a monument of carefulness and observation.

In connection with his monograph, or rather as leading up to it and providing material for it, Fryer had accumulated a vast mass of specimens which he mounted with great care. Some years ago one of us corresponded with him as to the possibility of his *Potamogeton* herbarium, on the completion of his work, finding a resting-place—as will now be the case—in the National Herbarium, but the view which at that time prevailed as to the incorporation of all specimens in one series prevented his entertaining the notion.

> "The few botanists who have glanced at my collection" (he says) "—no one has looked through a tenth part of it—all say it would be deprived of its special value if mixed with other specimens, or altered in any way. . . . In some form or other the collection will probably come to the Museum, but if it is to be *mixed* it would be better for me to reduce the specimens by about nine-tenths, and so let the remaining thousand specimens represent the whole. I really do not know how many specimens I have; the drying-press numbers run to about 3000, and some of them have ten or more sheets of reserved specimens. Dr. Tiselius's contributions probably fill 500 sheets. When the collection is looked over by anyone who has a month or two to spare, my reputation for

liberality will be gone for ever, and I shall be set down as a fit companion for Daniel Dancer and other eminent misers."

In another letter he writes :—

"Many of the specimens must be gummed down to the paper—glue would ruin them. To this I add that I must do this myself—no ordinary mounter of museum specimens could do it properly. Pray do not think me too conceited! in this respect I am not a bit so—I merely *know* what is wanted, no one save a special *Pot. man* can know. . . . . Again, ordinary botanical paper is quite unfit for mounting Pots. if they are to be *studied.* Paper such as I by chance hit upon is just suitable. It is firm enough to handle, and yet is sufficiently translucent to admit of the venation being closely examined. . . . . To show all that I had in view in making such a long series of the same form, it is necessary that the whole mass should be rearranged and catalogued, numbering each sheet. One set, for instance, would contain a series of forms from *lucens* to *heterophyllus* without a single gap! This would show the way in which two quite distinct species pass from one to the other without a missing link. Then each of the dozen species and hybrid species into which I have broken up this mass of allied forms wants illustrating by some fifty sheets of each segregate. Less than that number would not give the sluggish human intellect a true conception of a species. I have no idea of how many sheets there will be when, if ever, all is finished, five or six thousand at least—how many more?"

Fryer left several separate collections of pond-weeds: one consists largely of foreign specimens, one of a series of British forms, but these two, though in separate cabinets and containing many duplicates, should be doubtless considered as forming one united whole. He always impressed upon his friends the necessity of having a long series of specimens to show the range of variation with sufficient clearness, and many apparent duplicates must by no means be so considered. A third collection consists of picked specimens, to show to visitors who could not for want of time examine the full series, while a fourth is of extra specimens, no doubt originally intended for exchange. All the collections are to go to Mr. Charles Bailey for his life; the bulk is to be sent, after his death, to the Botanical Department of the British Museum, and a set of the duplicates to the Botany School at Cambridge.

One daughter by his first marriage and six children by his second remain to mourn Fryer's decease; Miss Rose Fryer, his eldest daughter, contributed beautiful coloured drawings to the third edition of Sepp's *Nederlandsche Insekten*, published in 1905. A grand-nephew, Claude Fryer, has just completed his course at Cambridge with the highest honours in Natural Science, and is at present working in Ceylon.

Fryer was a delightful companion in the field, where he discoursed on the most varied subjects; and one of the writers of this notice has had many pleasant expeditions in his company during the last few years to the localities where the rarer species of *Potamogeton* occurred. It is often said that to know is to love, but the words are more true in his case than in many another.

The robust health which happily characterized Fryer throughout his life remained until a few days before his death, when he quickly succumbed to an attack of influenza followed by heart disease. He was buried at Doddington, near Chatteris. Two months previously he had written to the Editor of this Journal a letter, a portion of which may fitly conclude this notice:—

> "Herewith my kindest wishes for the coming year to you and yours; and many heartfelt thanks to you for all the years of kindness and helpfulness you have given abundantly since we first met in the Museum. I can always see you as I saw you then; a kindly but disciplinary face coming towards me full of helpfulness and greeting! This may seem in little agreement with my delayed reply to your welcome note of twelve months ago but it is not really so; in heart and mind I write to you almost daily, but never get the words written down. In fact the past year has been one of strenuous work, the hardest of a long life, and rest was needed. Now at eighty-five I have given up the garden that used up all my energy, and hope to finish the natural history work that is due from me.
>
> "I don't feel old, and can walk a dozen miles without fatigue, or twenty at a pinch, so I hope for enough time to enable me to put my *plant*-house in order; the more important order has been in the doing for some eighty years, and cannot be altered or undone by any effort of mine. The mercy of The Father can alone forgive and amend that."

A. H. Evans.
James Britten.

The accompanying portrait is from a photograph taken in 1901.

A REVISION OF THE GENUS *BERTIERA*.

By H. F. Wernham, B.Sc.

The Genus.

The examination of various *Rubiaceæ* in the course of my duties in the National Herbarium has led me to attempt the revision of some of the more doubtful genera. *Hamelia* formed the subject of a previous paper (Journ. Bot. xlix. 206), and in the present one the allied genus *Bertiera* will be dealt with. The latter shares with *Hamelia* the characters of the tribe *Hameliеæ*, viz., a fleshy indehiscent fruit containing a large number of minute seeds, usually angular and flattened, with foveolate testa and fleshy albumen. It differs from *Hamelia* in having contorted corolla lobes and a bilocular ovary, the five anthers being subsessile in the throat of the corolla, and also in its general facies, which is more or less distinctive. As in the case of *Hamelia* the unopened corollas are characteristic, being conspicuously pointed at the apex of the bud, sometimes lengthily acuminate. The leaves are invariably opposite, never whorled, with sheathing stipules; the whole plant forms a shrub usually, or occasionally a small tree.

The genus was founded by Aublet upon a shrub collected by him in the woods of Aroura, Guiana, the publication of the name dating from 1775; a co-type is preserved in the National Herbarium. Aublet gave a careful and detailed description, naming the species *B. guianensis*; this has proved to be the most widely distributed of any of the species which have been relegated to the genus, although it does not extend beyond the American tropics.

The next published mention of *Bertiera* occurs in F. Gaertner's *Carpologia* (p. 75, t. 192), published in 1805, in which the fruits of two species are figured and described. The distinction between the two is based upon the character of the persistent calyx which crowns the bilocular berry. In one, *B. mucronata*, the segments of the calyx-limb are erect and more or less rigid; this appears to be identical with Aublet's *B. guianensis*, and is so regarded by A. Richard (Mém. Soc. Hist. Nat. Par. v. 254). The question cannot, however, be finally decided, as Gaertner describes the fruit only, and gives no hint of locality; he makes no mention of *B. guianensis*. In Gaertner's other species, *B. Zaluzania*, the calyx-segments are reflexed or spreading and ultimately form an umbilicus on the berry. This plant, rightly referred to the genus *Bertiera*, had been described and figured in MS. by Commerson as a new genus, *Zaluzania*; the latter collected it in Mauritius—a locality widely remote from that of *B. guianensis*, and at the other extreme of the area of distribution as known at the present time.

F. Gaertner also described what was to prove a third species of *Bertiera*, and in a third distinct area of distribution, namely, the African continent. The plant in question was collected by Smeathman in Sierra Leone, and named *Genipa labiata* in L'Héritier's herbarium. Gaertner founded the genus *Pomatium* upon this plant (Carpol. 252, t. 225, fig. 10), naming it *P. spicatum*, and giving a short description of the general external characters of the whole plant, as well as of the fruit. The latter has the spreading calyx of the *B. Zaluzania* type (*supra*), and Smeathman's plant, which is preserved in the National Herbarium, is undoubtedly referable to the genus *Bertiera* (*v. infra*). An interesting feature of Gaertner's description is his recognition of the near affinity between his *Pomatium* and *Hamelia*.

Poiret in his continuation of Lamarck's *Encyclopedia* (Encyc. Meth. Supp. i. 625) recognizes two of the three species already referred to—*B. guianensis* and *B. Zaluzania*; but makes no reference to *Pomatium*, which was, doubtless, unpublished at the time he was preparing this part of his work.

A. Richard published his "Mémoire sur la Famille des Rubiacées" in 1829, in the fifth volume of the Mém. Soc. Hist. Nat. de Paris. He there gives descriptive characters for the genus, and recognizes six species, *viz.*:—*B. guianensis* and *B. Zaluzania*, previously described; *B. africana*, the name he gives to the *Pomatium spicatum* of F. Gaertner (*supra*), after pointing out the identity of the latter genus with *Bertiera*; and three new species of his own description—*B. borbonica* and *B. fera* from the island of Bourbon (Île de la Réunion), and *B. palustris* from Guiana.

A. Richard further identifies J. Gaertner's genus *Tarenna* (Fruct. i. 139, t. 28 (1788)) with *Bertiera*; but from Gaertner's description, as well as the figure, the calyx appears to be 4-merous, while *Bertiera* seems to be essentially 5-merous, as Richard himself implies in his description of the allied genus *Higginsia* (loc. cit. 255). The rugose seeds of this *Tarenna*, again, do not correspond with the foveolate seeds typical of *Bertiera*; nor, moreover, does the locality—Ceylon—favour the suggestion that Gaertner's *Tarenna* is synonymous with *Bertiera*. Gaertner's fruit very probably is that of an *Adenosacme*, an Asiatic genus with which *Bertiera* has been confused by Blume and Don (*infra*).

De Candolle in his *Prodromus* (iv. 392 (1830)) adopts five of the six species in Richard's memoir, from which the essence of his descriptions is taken, differing from the latter author in retaining *Pomatium* as a genus. He follows, however, the error of Blume (Bijd. Fl. Ned. Ind. 987) in associating the genus *Mycetia* of Reinwardt with Aublet's *Bertiera*, and so adds three Javan species to the latter genus; they belong, however, to *Adenosacme* (v. Benth. & Hook. Gen. Pl. II. i. 69).

G. Don (Gard. Dict. iii. 505 (1837)) follows De Candolle exactly in the enumeration of the species, adding one, *B. coccinea*, which has since been identified with *Mussænda elegans*. He admits, however, that his species is "not sufficiently known," and, strangely enough, treats the subject of its culture and propagation under *Mussænda*. Don retains the genus *Pomatium*. Under the head of "species not sufficiently known" Don described two species proper to *Bertiera* under *Wendlandia*, an Asiatic genus, viz., *W. pilosa* and *W. racemosa*. The former is identical with *B. africana* Rich.—*i. e.* with *Pomatium spicatum* Gaertn.; the type of Don's plant is preserved in the National Herbarium. The type of *W. racemosa*, also in the National Herbarium, has no flowers, but fruits only. Bentham, in Hooker's *Niger Flora*, p. 394, discusses Don's *W. racemosa*, pointing out that the fruit and seeds do not in any way correspond structurally with those of *Wendlandia*, suggesting *Bertiera* as the proper genus, in spite of the unusually large size of the berry; specimens collected since fully justify this suggestion, and Don's plant was undoubtedly a *Bertiera*. Bentham described at the same time a new species, *B. laxa*, from Fernando Po, with inflorescence of the lax thyrsoid type characteristic of the American and Mascarene species.

Since Bentham's work just mentioned (1849) until the present time only three new species from America have been described, and one from Madagascar. The most numerous additions have been from the African continent, so that the African species known now far exceed the rest in number.

It will be gathered from the foregoing brief historical sketch of our knowledge of the genus that its distribution is somewhat curious. Unlike its ally *Hamelia*, *Bertiera* is not confined to the New World. There are three areas of distribution, no species being common to any two of them, *viz.*: (1) The tropical American area; (2) the tropical African area; (3) Madagascar and the Mascarene Islands. Within each area, again, the distribution is limited.

None of the Madagascar species, for instance, have been found in the other Mascarene Islands, nor *vice versa*. One species, *B. gonzaleoides*, is endemic in Cuba, but the genus is absent from the other islands of the West Indies, and, except for one Nicaraguan species (*B. oligosperma*), elsewhere in Central America. A species described by Bentham, *B. angustifolia*, was collected in the isolated Cocos Island, on the Sulphur expedition. The American *B. guianensis*, the most widely spread of any of the species, occurs from Panama to Trinidad and Guiana in the north to Bolivia and Barra in the south and south-east, respectively.

On the African continent the genus occurs as far north as Senegambia (*B. labiata*), but not south of the Congo; Upper Guinea is the area richest in species; and the most easterly points of distribution are Niamniam-land (*B. æthiopica*) and Uganda (*B. montana*).

THE SPECIES.

I have arranged the species in four sections, in accordance with the type of branching in the inflorescence. In the first section (*Divaricatæ*) the branching is dichasial, and no definite main rachis is differentiated. In the second and third a pronounced median rachis occurs; this bears lateral cymose branches, which may be relatively long and pedicellate, the flowers being more or less laxly arranged (*Laxæ*); or the lateral rachides may be quite short or obsolete, the inflorescence being therefore spicate or subspicate (*Spicatæ*). In the fourth section (*Capitatæ*) all the flowering branches tend to suppression, and the inflorescence is capitate or subcapitate.

These sections are by no means sharply differentiated, although the species typical of each are readily distinguished. Transitional species occur; and perhaps the most interesting is *B. laxissima*, which links *Divaricatæ* with *Laxæ*, and gives a hint as to how the prominent median rachis of the latter section may have been derived from the dichasial branching of the former. Tracings made from the actual plants are reproduced in the appended diagrams. No. 1 shows the dichotomous inflorescence of *B. breviflora* (the ultimate branches are not shown at their full length, which may be very considerable). No. 2 is a full tracing of the inflorescence of *B. laxissima*, and it will be readily seen that the main rachis doubtless owes its ill-defined and sinuous character to its obvious origin from a succession of dichotomies. No. 3 is a similar diagram of the inflorescence of *B. Batesii*, revealing a more definite main rachis, but the latter retains clear evidence of its similar origin. No. 4 is a full tracing of the thyrsus of *B. guianensis*, typical of the section *Laxæ*, with a straight and well-defined median rachis; but it will be seen that dichotomy still plays an important part in the branching.

The *Divaricatæ*, then, will be regarded in the present arrangement of the species as the relatively primitive section. From these the *Laxæ* were derived in the manner suggested above.

The *Spicatæ* would then emerge as the result of suppressing the lateral branches in *Laxæ*; this transition is reflected in *B. bracteolata* and *B. macrocarpa* (*q. v.*). Finally, the *Capitatæ* may have originated from *Spicatæ* by shortening and ultimate suppression of the rachis; or, on the other hand, it might be conceived not unreasonably that the *Divaricatæ* may have given rise to the *Capitatæ* more directly by suppression of all the axes. *B. Laurentii*, however, seems to leave little doubt as to which supposition we should incline to adopt. In this species a single abbreviated but well-pronounced main axis is present, and this is significant as indicative of the probable origin of *Capitatæ* directly from *Spicatæ*.

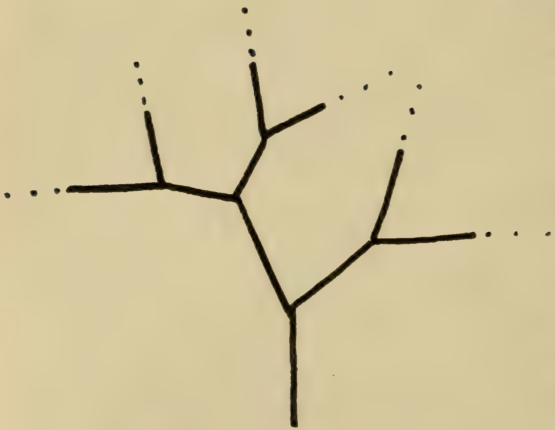

Fig. 1.—*B. breviflora.*

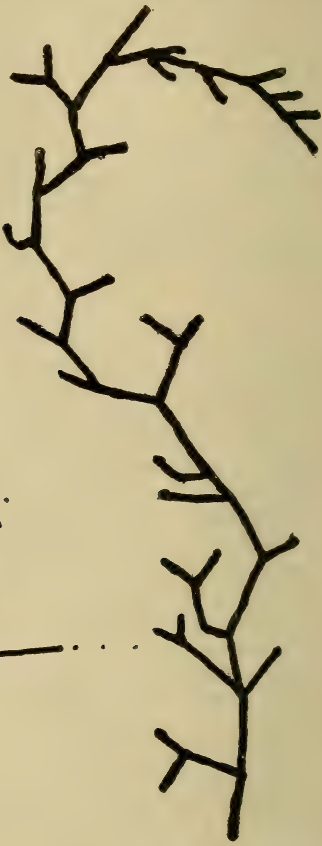

Fig. 2.—*B. laxissima.*

Thirty-three species are recognized in the present paper—twenty-one from the African continent, seven from the New World, one from Madagascar, and four from the other Mascarene Islands. The five latter and the American species, with one exception, belong to the section *Laxæ*, the exception being the Nicaraguan *B. oligosperma*, one of the *Spicatæ*. The relation apparent between the distributional areas and the proposed sections lends some support to the view that the latter may represent more or less truly natural groups.

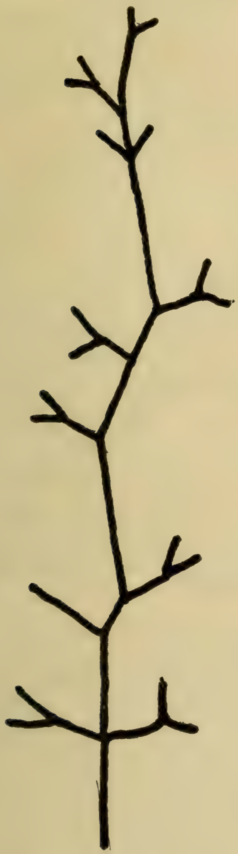

Fig. 3.—*B. Batesii.*

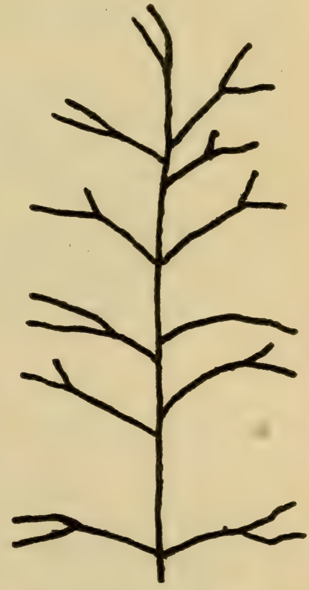

Fig. 4.—*B. guianensis*

KEY TO THE SPECIES.

Inflorescence composed of several divaricate dichotomous branches, no one predominating in length over the others. (DIVARICATÆ.)

Calyx-limb truncate, entire, stipules 2·5 cm. long ... 1. *B. Dewevrei.*

Calyx-limb deeply lobed, stipules seldom so much as 2 cm. long .... 2. *B. breviflora.*

Inflorescence with an indefinite main rachis, the lateral cymose branches relatively long, flowers not crowded. (LAXÆ.)

Inflorescence usually very long, often exceeding the leaves, and lax; main rachis often sinuous. (Tropical African continent.)

Flowers sessile or with relatively short pedicels.

Inflorescence axis very sinuous, indefinite; flower-buds hispid, with yellowish hairs...................... 3. *B. laxissima.*

Inflorescence axis not very sinuous, well pronounced; flower-buds not hispid.

Open corolla less than 1 cm. long, subglabrous externally .... 4. *B. Batesii.*

Open corolla 2 cm. to 2·5 cm. long, white or grey, sericeo-tomentose externally......................... 5. *B. laxa.*

Flowers with pedicels 8 mm. long .... 6. *B. pedicellata.*

Inflorescence usually not very long nor lax nor much, if at all, exceeding the leaves; main rachis straight and well pronounced.

Flowers 5–7 mm. long at most. Bracteoles inconspicuous, minute or obsolete. (Tropical American.)

Branchlets usually glabrous .... 7. *B. gonzaleoides.*

Branchlets usually cinereo-pilose (but see *B. guianensis*).

Berries usually not ribbed; calyx glabrous, or nearly so.

Lateral inflorescence branches very diffuse, 10–30-flowered .... 8. *B. parviflora.*

Lateral inflorescence branches more or less rigid, few-flowered .... 9. *B. procumbens.*

Berries usually ribbed; calyx strigose-pubescent.

Plant subherbaceous (ex descr.) .... 10. *B. palustris.*

Plant a shrub

Leaves lanceolate, narrow, lengthily acuminate 11. *B. angustifolia.*

Leaves mostly ovate or broadly elliptical, not lengthily acuminate .... 12. *B. guianensis.*

Flowers not exceeding 8 mm. Bracteoles subfoliaceous, much exceeding the calyx. (Madagascar.) 13. *B. longithyrsa.*

Flowers 7 mm.–1 cm. or more long. Bracteoles not conspicuous. (Mascarene Islands.)

Branchlets and inflorescence axes clothed with dense ferruginous hairs .... 14. *B. fera.*

Branchlets and inflorescence axes glabrate or silky pubescent.

Lateral branches of inflorescence long, much branched, often sinuous, 10- or more flowered.

Stipules less than 1 cm. long................... 15. *B. borbonica.*

Stipules 2·5–3 cm. long .... 16. *B. bistipulata.*

Lateral branches of inflorescence short, rigid, little branched, 2–6-flowered .... 17. *B. Zaluzania.*

Inflorescence with a long main rachis, narrow cylindrical in contour, the lateral cymose branches relatively short, but the flowers not crowded. Bracteoles nearly or quite equalling the fruit .... 18. *B. bracteolata.*

Inflorescence spicate or subspicate, the lateral cymes being sessile or almost so; the flowers in each more or less densely crowded. (Spicatæ.)

Stipules 2–3 cm. long.

Shoots pilose hispid, with outstanding ferruginous hairs 19. *B. labiata.*

Shoots glabrate, or appressedly pubescent.

Corolla-tube less than, rarely as much as, or slightly exceeding 1 cm. long.

Branchlets sericeo-pubescent, corolla pubescent externally.

Lateral cymes pedicellate, sometimes ample 20. *B. racemosa.*

Lateral cymes closely sessile.................. 21. *B. Thonneri.*
Branchlets and exterior of corolla quite glabrous
22. *B. glabrata.*
Corolla-tube about 1·5 cm. or more long.
Leaves oval-oblong .... 23. *B. montana.*
Leaves narrow-oblong .... 24. *B. retrofracta.*
Stipules seldom exceeding 1·5 cm.,—usually much less.
Bracteoles inconspicuous or absent, at least in the fruit.
Ripe berries 9 mm. × 8 mm. .... 25. *B. subsessilis.*
Ripe berries 5 mm. in longest diameter.
Lateral leaf-veins 7–8 pairs, prominent ...... 26. *B. æthiopica.*
Lateral leaf-veins 4–5 pairs, not prominent 27. *B. tenuiflora.*
Bracteoles apparent, filiform, exceeding the calyx.
Berry many-seeded.
Leaves glabrous or sparsely pubescent above ... 28. *B. gracilis.*
Leaves hispidulous above, with densely pilose midrib
29. *B. cinereo-viridis.*
Berry few (6–8-) seeded........................... 30. *B. oligosperma.*
Inflorescence capitate or subcapitate. (CAPITATÆ.)
Fruits not exceeding 5 mm. in diameter.
Inflorescence subcapitate, relatively lax, shoots and leaves glabrous .... 31. *B. Laurentii.*
Inflorescence a close capitulum, stem sericeo-tomentose
32. *B. globiceps.*
Fruits upwards of 1 cm. in diameter, with elongated pedicel
33. *B. capitata.*

(To be continued.)

THE FLORA OF LONDON BUILDING-SITES.

BY J. C. SHENSTONE, F.L.S.

AN account which attracted some attention from the Press of a collection of wild plants found upon a building-site in Farringdon Street was contributed by the writer to the *Selborne Magazine* of October, 1910. It appeared likely that similar collections, made upon other building-sites in the City and West End of London, might afford information as to the means by which the seeds of plants are conveyed to central positions of this large city.

Visits have been made during the past summer to a large space behind the British Museum in Bloomsbury, a site abutting upon Upper Thames Street, a site in Russell Street, Covent Garden, and a site at the corner of St. John's Street and Aylesbury Street, Clerkenwell.

The plants collected upon the above sites have been grouped in the following lists, in order to ascertain the most likely means by which their seeds were distributed. Some of the plants might have been included in more than one of the groups into which the lists are divided, but the evidence was carefully balanced in each case, and the plant placed in the group to which it appeared to belong.

The numbers which follow the plant names in these lists refer to the other sites upon which the plants have been found, as follows:—

1. Farringdon Street.
2. British Museum, Bloomsbury.
3. Upper Thames Street.
4. Russell Street, Covent Garden.
5. St. John's Street, Clerkenwell.

1. The Farringdon Street Site.

An account of the plants found upon this site appeared in the *Selborne Magazine*, Oct. 10th, 1910. It will, however, be well to recapitulate the facts stated in that magazine which bear upon the present investigation.

This site had been cleared about two years, but no fewer than twenty-eight species of seed plants and ferns, two mosses, and one liverwort were observed upon it. It covered an area of about half an acre, and was formerly occupied by the works of Messrs. Harrild and Sons.

Wind-distributed Plants.

The plants of this group were probably carried to the site by the wind. It will be noticed that the groups of wind-distributed plants found upon all the sites were remarkably uniform in character. Further reference to these wind-distributed plants will be made in the concluding remarks.

Epilobium angustifolium L. 2, 3, 4, 5.
E. roseum Schreb. 4, 5.
Tussilago Farfara L. 2, 3, 4, 5.
Erigeron canadensis L. 2, 3, 4.
Senecio viscosus L. 2.
S. Jacobæa L. 2.
Carduus arvensis Robson. 2, 3, 4.
Taraxacum officinale Weber. 3, 5.
Salix (*caprea ?*). 3, 4.

Small-seeded Plants.

The plants included in this group are those which, when judged by their habit of growth and their small seeds, have probably been distributed by adhering to the feet of birds, or have passed through the digestive organs of birds uninjured. Such plants are sometimes distributed by ants, which carry them off to their nests, or they are washed about by the rains. Neither of the latter methods would, however, account for their presence in the centre of a large town. The fact that these plants were only found upon the larger sites, and upon the Upper Thames Street site, would lead us to infer that smaller building-sites are apt to be overlooked by birds.

Capsella Bursa-pastoris Medikus. 2, 5.
Stellaria media Villars. 2, 5.

Forage or Packing Plants.

In the article in the *Selborne Magazine* the suggestion was made that the main source of this class of plants found upon this site was the rough stuff used for packing machinery, formerly used in the works which occupied the site, and that forage contributed to the collection. The fact since observed that only the larger sites have long lists of this class of plants, and observations made upon the Bloomsbury site, which will be referred to later, suggests that the principal means by which these plants have been introduced to our city is the rough forage given to horses in their nose-bags, and that packing material only occasionally contributes to this group of plants.

Silene latifolia comb. nov. 2.
Melilotus officinalis Lamarck. 2.
Trifolium repens L. 2, 5.
Matricaria inodora L. 2.
Plantago major L. 2, 3, 4, 5.
Atriplex patula L. 2, 5.
Rumex crispus L.
Polygonum Persicaria L. 2, 4.
P. Convolvulus L. 2, 4, 5.
Avena sativa L. (cultivated form). 2, 3, 5.
Poa annua L. 2, 4, 5.
Pteris aquilina L. 3, 5.

Escapes from Cultivation.

The plants which are included under this heading are those which have, most likely, been left from some villa garden, or have germinated from kitchen refuse. Attempts at gardening are sometimes made even in city backyards.

Papaver somniferum L. (cultivated form).
Brassica Napus L. (cultivated form).
Raphanus sativus L. (cultivated form). 2, 5.
Carum Petroselinum Benth. & Hook. f. (cultivated form).
Ficus Carica L. (cultivated form).

A liverwort (*Marchantia polymorpha*) and two mosses (*Funaria hygrometrica* and *Bryum argenteum*) were also found upon this site (see site 4).

2. The Site behind the British Museum, Bloomsbury.

The clearance of this site was commenced some years ago, but it was not finally levelled until January, 1910. The flora presumably commences from the latter date. The flora is very varied for a site which had been levelled at so recent a date.

Wind-distributed Plants.

Epilobium angustifolium L. 1, 3, 4, 5.
Tussilago Farfara L. 1, 3, 4, 5.
Erigeron canadensis L. 1, 3, 4.
Senecio vulgaris L. 4, 5.
S. viscosus L. 1.
S. Jacobæa L. 1.
Carduus arvensis Robson. 1, 3, 4.
Sonchus oleraceus L. 5.

Small-seeded Plants.

Capsella Bursa-pastoris Medikus. 1, 5.
Coronopus procumbens Gilibert.
Stellaria media Villars. 1, 5.
Polygonum aviculare L. 5.

Forage or Packing Plants.

The list of forage plants upon this site is a very long one, and the following suggestion has been made to account for this large variety.

Mr. Upton, of the Bedford Office, tells me that when this area was levelled many horses with tumbrils were seen standing upon this site for comparatively long periods waiting for their loads, and were observed scattering much rough forage about them. This rough forage is frequently obtained by mowing rough riverside and waste place herbage. When at the Norfolk Broads, Mr. Upton saw men mowing rough herbage bordering upon the Broads, and he observed *Epilobium angustifolium* amongst this herbage. The plants found upon our building-sites, which I have included in this group, mainly consist of such species as one would expect to find amongst waste-place and waterside herbage, and it would appear to be quite likely that these plants have originated from such coarse forage. It would probably be mown before the grass-seed ripens, hence the absence of grasses from most of the sites visited, other than those one might expect to meet in London; *Agrostis alba* being the only meadow-grass which appears in most of these lists. The presence of oats, wheat, and barley, and such corn plants as *Lychnis alba*, would probably be due to the addition of tail corn, or the corn left after dressing operations, and chaff to the forage. The list of plants found upon this site, however, includes a mixture of meadow-grasses, but with the above exception these do not appear in other lists, and this would suggest the addition of meadow hay to the forage used upon this site. Some of the seeds may of course have passed through the digestive organs of the horses uninjured; further reference to these plants will be made in the concluding remarks. It will be noticed that, with the exception of the meadow-grasses above alluded to, the constituents of all the lists of forage plants suggest a similar origin. It appears likely that the nose-bags of the horses used upon this site may have contained a mixture of forage from different localities.

Sisymbrium officinalis Scopoli.
Thlaspi arvense L.
Silene latifolia comb. nov. 1.
Lychnis alba Miller.
Melilotus officinalis Lamarck. 1.
M. alba Desrousseaux.
Trifolium repens L. 1, 5.
Pastinaca sativa L.
Matricaria inodora L. 1.
Plantago lanceolata L.
P. major L. 1, 3, 4, 5.
Chenopodium album L.
Atriplex patula L. 1, 5.
Rumex obtusifolius L. 4.
Polygonum Persicaria L. 1, 4.
P. Convolvulus L. 1, 4, 5.
Phleum pratense L.
Agrostis alba L. 3, 4, 5.
Avena sativa L. (cultivated form). 1, 3, 5.
Poa annua L. 1, 4, 5.
P. pratensis L.
Dactylis glomerata L.
Serrafalcus arvensis Godron.
Triticum vulgare Vill. (cultivated form).
Lolium perenne L.

Garden Escapes.

The garden escapes upon the Bloomsbury site proved very interesting. In addition to such plants as *Ampelopsis quinque-*

folia, *Fragaria*, *Polygonum cuspidatum*, and others which we should expect upon the sites of town gardens, some interesting economic and medicinal plants were found. These would indicate that one of the houses was formerly occupied by a tenant interested in economic botany. Amongst these, *Carthamus tinctorius*, a plant largely cultivated in India as a dye material and for adulterating saffron, *Artemisia Absinthium*, *Camelina sativa*, an oil-yielding plant, and *Carduus setosus*, a variety of *C. arvensis*, which is rare in Britain, and likely to have been planted by a botanical student.

Camelina sativa Crantz.
Raphanus sativus L. (cultivated form). 1, 5.
Berteroa incana DC.
Fragaria (cultivated form).
Potentilla recta L.
P. intermedia L.
Ampelopsis quinquefolia Michx.
Œnothera biennis L.
Carthamus tinctorius L.
Artemisia Absinthium L.
Carduus setosus Bab.
Cichorium Intybus L.
Atropa Belladonna L.
Polygonum cuspidatum Sieb. & Zucc.
Ficus Carica L. (cultivated form). 1.

In addition to these groups of plants, *Sisymbrium Irio*, a plant which appeared in great abundance after the great Fire of London, and which has since appeared upon building-sites and brickfields in the vicinity of London. This plant must be placed in a group by itself.

Sisymbrium Irio L.

3. Upper Thames Street Site.

This site was formerly a wharf, and abuts upon the River Thames and upon Upper Thames Street. It consists of a narrow strip of ground, and Upper Thames Street being also a narrow street, the carts used for removing debris are not likely to have remained standing long. We should, therefore, expect the variety of plants to be limited. Only eighteen plants were found. Ten of these were wind plants, and one a small-seeded plant. This latter was found upon a wall, and thus confirms the suggestion that these plants may have been conveyed by birds. Only seven forage and packing plants were found upon this site, and these were quite as likely to have been introduced in packing material, as by horses.

Wind-distributed Plants.

Epilobium angustifolium L. 1, 2, 4, 5.
E. montanum L.
Tussilago Farfara L. 1, 2, 4, 5.
Erigeron canadensis L. 1, 2, 4.
Carduus arvensis Robson. 1, 2, 4.
Taraxacum officinale Weber. 1, 5.
Sonchus arvensis L.
Salix (*nigricans* ?).
S. (*caprea* ?). 1, 4.

Small-seeded Plant.

Cerastium vulgatum L. 5.

Forage or Packing Plants.

Plantago major L. 1, 2, 4, 5.
Urtica dioica L.
Agrostis alba L. 2, 4, 5.
Avena sativa L. (cultivated form). 1, 2, 5.
Hordeum distichon L. (cultivated form).
Pteris aquilina L. 1, 5.

4. Site in Russell Street, Covent Garden.

This site was formerly occupied by small tenements; these were pulled down as the leases expired, from 1901 to 1906. The area of the site is comparatively limited, and the street is not a wide one. An extensive forage-plant flora could scarcely be expected upon this site, and villa gardening is not likely to have been practised in such a contracted area. The nearness of Covent Garden Market might lead us to anticipate some interesting plants from this source. None, however, were found. This confirms the opinion that plants found in central town situations must have been carried on to the spot, either by wind, birds, or by the direct or indirect agency of man.

Wind-distributed Plants.

Epilobium angustifolium L. 1, 2, 3, 5.
E. roseum Schreb. 1, 5.
Tussilago Farfara L. 1, 2, 3, 5.
Erigeron canadensis L. 1, 2, 3.
Artemisia vulgaris L.
Senecio vulgaris L. 2, 5.
Carduus arvensis Robson. 1, 2, 3.
Salix (*caprea* ?). 1, 3.

Forage or Packing Plants.

Sinapis arvensis L.
Plantago major L. 1, 2, 3, 5.
Rumex obtusifolius L. 2.
Polygonum Persicaria L. 1, 2.
P. Convolvulus L. 1, 2, 5.
Agrostis alba L. 2, 3, 5.
Poa annua L. 1, 2, 5.
Lastrea Filix-mas Presl.

A liverwort (*Marchantia polymorpha* L.) bearing sporogonium was found upon this site (see site 1).

5. Site at the Corner of St. John's Street and Aylesbury Street, Clerkenwell.

This site, the property of the London County Council, was at the time of my visit partially covered with road material, and much of the uncovered part had been trodden down, and had become turfed with *Poa annua*. The space is somewhat extensive, and no doubt horses had stood upon it with their nose-bags, both during the clearing of the site and in carting road material. There is little doubt a more varied flora would have been found upon this site if it had been visited before the space had been covered by road material, and before it had been so much trodden upon.

Wind-distributed Plants.

Epilobium angustifolium L. 1, 2, 3, 4.
E. roseum Schreb. 1, 4.
Tussilago Farfara L. 1, 2, 3, 4.
Senecio vulgaris L. 2, 4.
Taraxacum officinale Weber. 1, 3.
Sonchus oleraceus L. 2.
Salix (species?).
Populus nigra L.

Small-seeded Plants.

Capsella Bursa-pastoris Medikus. 1, 2.
Stellaria media Villars. 1, 2.
Cerastium vulgatum L. 3.
Polygonum aviculare L. 2.

Forage or Packing Plants.

Trifolium repens L. 1, 2.
Sambucus nigra L.
Achillea Millefolium L.
Plantago media L.
P. major L. 1, 2, 3, 4.
Atriplex patula L. 1, 2.
Polygonum Convolvulus L. 1, 2, 4.
Agrostis alba L. 2, 3, 4.
Avena sativa L. (cultivated form). 1, 2, 3.
Poa annua L. 1, 2, 4.
Pteris aquilina L. 1, 3.

Cultivated Plants.

Brassica oleracea L. (cultivated form).
Raphanus sativus L. (cultivated form). 1, 2.
Oxalis Acetosella L.

This last, though a common English plant, was most likely introduced from a cultivated specimen.

CONCLUDING REMARKS.

A notable feature in the above lists is that the wind-distributed plants are well represented upon each site, and that most of the plants were found upon all, or at least upon several, of the sites. The efficiency of the wind-distributing organs for scattering seeds in towns is thus clearly demonstrated.

A visit to the well-known Aldwych site during July afforded an interesting demonstration of the distributing power possessed by these seeds. Clouds of seeds, probably mainly those of *Epilobium angustifolium*, could be seen floating in every direction, and could be traced in one direction as far as Bloomsbury without difficulty. There they were reinforced by seeds from the Bloomsbury site. It is, indeed, possible that the Aldwych site may have been a distributing centre from which all the sites dealt with in this paper have received wind-distributed plants. These plants were, however, probably first introduced into London by other means. *E. angustifolium* is frequent in villa gardens, and when introduced into one villa garden in a district it rapidly spreads into other villa gardens for a considerable distance. Dr. Henry Laver, of Colchester, called my attention to his stable pit, in which many seedlings of this plant could be seen; he ascribed their presence to the forage upon which his horses had been fed having been sprinkled plentifully with the seeds. It is evident that, in this manner, wind-distributed seeds would be much better able to introduce themselves into new districts, and when once introduced would rapidly spread.

The number of forage plants in the above lists varies very widely. If we exclude the Clerkenwell site, upon which much vegetation had evidently been destroyed, the number of species may be said to be roughly proportional to the area of the site. The smaller sites visited are in somewhat crowded situations, and a comparison of the lists will strengthen the suggestion that the number of species found corresponds with the space afforded for horses to stand during the time that the site was being cleared and levelled. In the case of the Upper Thames Street wharf, and possibly some of the other sites, the few plants of the kind included in this group may have been due to rough packing material derived from the same source as rough forage.

Attention has already been called to the interesting variety of garden escapes found upon the Bloomsbury site, suggesting the probability of a residence upon the site having been occupied by a botanist interested in economic plants. Of the garden escapes found upon these sites only *Raphanus sativus* and *Ficus Carica* occurred upon more than one site, thus showing that plants belonging to this group were either intentionally introduced on each site by man or were derived from the scattering of kitchen stuff.

The plants likely to have been introduced by birds are few in number, and were absent from some of the sites. It is evident that this means of plant distribution is not effective in large towns. Probably the few birds which reach the centre of our large towns would have deposited their seeds before reaching the heart of the city.

It is worthy of note that a total of seventy-eight species were found upon these five sites. A surprising result when we consider the situation of the sites and the brief period which intervenes between the clearing of a site and the erection of new buildings.

The five centres visited afford scarcely sufficient data to justify dogmatic conclusions as to the means by which plants are carried into the centres of large cities, but a comparison of these five sites points clearly to a common origin for most of the groups of plants discovered, and suggests their distribution in the manner described.

I must thank Mr. A. R. O. Stutfield, Steward of the Bedford Estate, and Mr. Mark M. Merriman, clerk to the Dyers' Company, for affording facilities for visiting sites, and members of the staff of the National Herbarium for assistance in naming plants. Thanks are also due to Mr. Miller Christy and to Mr. E. Bidwell for kind assistance.

THE GENUS *TANNODIA* BAILL.

BY D. PRAIN, M.B., F.R.S.

THE Euphorbiaceous genus *Tannodia* was founded by Baillon in 1860 (*Adansonia* i. 184) on specimens of a plant collected by Boivin in 1850, in Mayotte, one of the Comoro group. The name first proposed was *Tandonia*, in compliment to Moquin-Tandon. But another *Tandonia* had already been proposed in *Chenopodiaceæ*; in a subsequent page (*l. c.* p. 251) Baillon therefore modified the name. A figure of an inflorescence with part of a leaf and an enlarged figure of the andrœcium accompany the description (*l. c.* t. 7, figs. 1, 2).

Discussing the affinity of the genus, Baillon has remarked on the similarity of the male flower to that of *Jatropha*, but has pointed out that *Jatropha* and *Tannodia* differ greatly as regards the female flower. He has suggested a comparison of *Tannodia* with the tribe *Galearieæ*, from which, however, the position of the stamens of the outer whorl excludes this genus. He has also pointed out the intimate alliance of *Tannodia* and *Agrostistachys* Dalz.; this is clearly the true affinity, though its terminal in place of lateral inflorescences indicates that the Comoro species is generically distinct from Dalzell's one.

Mueller, after examining Baillon's material in 1866 (DC. Prodr. xv. 2, 728), tentatively referred *Tannodia* Baill. to *Crotoneæ-Chrozophoreæ*, near *Sumbavia* Baill. This suggestion, accepted by subsequent writers, is not at all unsatisfactory.

Pax, in 1897 (Engl. Bot. Jahrb. xxiii. 523), based on specimens collected in the Comoros by Schmidt and by Humblot a species named by him *Agrostistachys comorensis*. A comparison of Boivin's specimens named *Tannodia cordifolia* by Baillon with Humblot's specimens named *Agrostistachys comorensis* by Pax, shows that the two are conspecific. This, from the descriptions supplied by these authors, was hardly to be anticipated. Baillon describes Boivin's plant as monœcious, and as having a 5-lobed male calyx; Pax describes Humblot's one as diœcious, and as having a 2-lobed male calyx; moreover, the descriptions given by both authors are found, on examination, to be equally correct.

The clue to the situation has been provided by the communication by Swynnerton, from Gazaland, of a species described in 1911 by S. Moore (Journ. Linn. Soc. Bot. xl. 194) as *Croton Swynnertonii*. The resemblance of this plant to certain species of *Croton* is striking; the erect position of the anthers in bud nevertheless excludes it from that genus. But the resemblance which this Gazaland tree bears to the Comoro plant already referred to is more striking still. As regards foliage they are not distinguishable. The male flowers of the Gazaland species are slightly larger than those of the Comoro plant; but, apart from this, the only characters which distinguish the two are the loftier stature of the Gazaland species and the fact that its flowers are 4-merous, whereas those of the Comoro one are 5-merous. In

Swynnerton's specimens of this Gazaland tree it is found that the racemes on what are male trees bear male flowers only. But in the case of the racemes from what are female trees it is found that, while most of these bear female flowers only, some bear here and there male flower-buds associated with female flowers in the axils of the same bracts. These male flowers on female racemes are rather smaller in size than the male buds on male racemes, with the calyx sometimes 4-lobed in place of 2-lobed; they are also rather later of development than the female flowers with which they are associated. In the Gazaland plant we find, therefore, a repetition of the conditions manifest in the Comoro species. The only difference is that, whereas Swynnerton's material fully explains the floral characters of the Gazaland plant, Boivin's specimens of the Comoro one only exemplified that condition of its female in which males are associated with female flowers, while Humblot's specimens of the same species exemplified, along with strictly male individuals, only those females in which no males accompany the female flowers. It is noticeable that, just as in the Gazaland plant, the calyx in male flowers on female racemes may be 4-lobed whereas that in male flowers on male racemes is 2-lobed, so in the Comoro plant the calyx in male flowers on female racemes may be 5-lobed whereas that in male flowers on male racemes is 2-lobed. It is interesting and important to observe that, although Baillon and Pax have been alike handicapped, owing to the absence of complete material, these able botanists have independently recognized the true affinity of the species.

The presence in Gazaland of the interesting tree discovered by Swynnerton has incidentally led to another conclusion. In 1909, Pax, in dealing with two plants collected in German East Africa by Goetze and Holst respectively, based upon these a new and apparently very distinct genus, *Holstia* Pax (Engl. Bot. Jahrb. xliii. 220). With this genus *Holstia* the Gazaland plant agrees in having terminal inflorescences; in having a ring of disk-glands in the male flower and a disc in the female flower; in showing the same relative position of petals, disk-glands, and outer stamens; and in having the same ovary and stigmas. The Gazaland plant differs from the only *Holstia* in which the female flower is known in having the female calyx with short triangular lobes and the female petals much longer than the calyx, whereas in *Holstia* the female calyx is deeply partite with spathulate lobes, and the female petals are shorter than the calyx. But these differences are at best only of sectional value, and leave no doubt that the Gazaland plant is congeneric with the species upon which *Holstia* was based. Since, however, the Gazaland plant is at the same time certainly a *Tannodia*, the reduction of *Holstia* to Baillon's genus is unavoidable.

The specific descriptions which Baillon, Pax, and Moore have supplied are so precise that nothing would be gained by their repetition. Having regard, however, to the difficulties which have been experienced in referring the various species of *Tannodia*

to their proper genus, it may serve a useful purpose if a diagnosis of that genus, modified in accordance with existing knowledge, be supplied. To that diagnosis is appended a nominal list of the species.

TANNODIA Baill. Adans. i. 251, t. 7, figs. 1, 2 (1860). Flores dioici vel casu polygamo-dioici, petaliferi. ♂ Calyx 2–5-partitus, lobis valvatis. Petala 5, raro 4. Discus e glandulis 5 vel 4 petalis filamentisque exterioribus alternis compositus. Stamina 7–12, 2-seriata; filamenta seriei exterioris petalis isomera iisque opposita, basi libera et sæpissime filamentis seriei interioris basi parum connatis paulo breviora; antheræ oblongæ, dorsifixæ, 2-loculares; loculi paralleli rimis longitudinalibus exteriorum semper introrsum, interiorum nunc extrorsum nunc lateraliter dehiscentes. Ovarii rudimentum 0. ♀ Calyx 5- vel 4-lobus, lobis imbricatis inæqualibus. Petala 5 vel 4. Discus cupuliformis vel annularis. Ovarium 3-loculare, pubescens; ovula in quoque loculo solitaria; styli 3, glabri, basi breviter connati, primum erecti, demum patuli, semel 2-fidi. Capsula 3-cocca, pubescens; cocci 2-valves. Semina ovoidea, ecarunculata; testa crustacea, opaca; albumen carnosum; cotyledones planæ, latæ.—Frutices arboresve. Folia alterna, petiolata, basi 3–5-nervia, costâ medianâ penninervi, margine integra vel casu breviter 3-loba. Flores parvi vel minuti in racemos tenues terminales dispositi, bracteati bracteolatique, utriusque sexus sub quaque bractea sæpius 2-ni rarissime plures, sæpissime longiuscule pedicellati pedicellis semper articulatis.

Species 4, Africæ tropicæ et insularum Comorensium incolæ.

Genus in sectiones 2 dividitur:—

1. *Eutannodia.* Calyx ♀ 5- vel 4-fidus, lobis triangularibus. Petala ♀ calycem magnopere excedentes.—Tandonia Baill. Adans. i. 184 (1860) non Moq.

2. *Holstia.* Calyx ♀ alte 5-partitus, lobis spathulatis. Petala ♀ calyce multo breviora.—Pax in Engl. Bot. Jahrb. xliii. 220 (1909) pro genere.

SPECIERUM ENUMERATIO.

§1. *Eutannodia.* Calycis ♀ segmenta brevia, triangularia. Petala ♀ calyce 3-plo longiora. Flores nonnunquam polygamodioici.

1. TANNODIA CORDIFOLIA Baill. Adans. i. 251, t. 7, figs. 1, 2 (1860). Flores 5-meri.—Muell.-Arg. in DC. Prodr. xv. 2, 728 (1866). *Tandonia cordifolia* Baill. l. c. 184 (1860). *Agrostistachys comorensis* Pax in Engl. Bot. Jahrb. xxiii. 523 (1897).

Insulæ Comorenses. Mayotte; apud aquæ dejectus M'sapéré, Boivin! in locis haud exacte notatis, Humblot 382! 390! Schmidt 194.

2. TANNODIA SWYNNERTONII Prain. Flores 4-meri.—*Croton Swynnertonii* S. Moore in Journ. Linn. Soc. Bot. xl. 194 (1911).

Africa orientalis. Africa orientalis lusitanica; in sylvis Chirinda ditionis Gaza, 1000–1200 m. s.m., Swynnerton 109! 6519.

§2. *Holstia.* Calycis ♀ segmenta elongata, spathulata. Petala ♀ calyce breviora. Flores stricte dioici.

3. Tannodia tenuifolia Prain. Pedicelli calyce longiores.

Var. α *genuina*. Folia pubescentia.—*Holstia tenuifolia* Pax in Engl. Bot. Jahrb. xliii. 220 (1909).

Africa orientalis. Africa orientalis germanica; secus fl. Lofia, 600 m. s.m., Goetze 442! In ditione Nyassa; in montibus Shire apud Ruo, Scott Elliot 8664! Rhodesia; Boruma, Menyharth 794!

Var. β *glabrata* Prain. Folia glabra.

Africa orientalis. Africa orientalis germanica; Usambara orientalis, inter Lungusam et Deremam, 450–600 m. s.m., Engler 444! Africa orientalis lusitanica; Mozambique, apud Gorongoza, ad fl. M'kulumazi, Vasse 440!

4. Tannodia sessiliflora Prain. Pedicelli calyce breviores.—*Holstia sessiliflora* Pax in Engl. Bot. Jahrb. xliii. 220 (1909).

Africa orientalis. Africa orientalis germanica; Usambara, apud Buiti, Holst 2377!

A NEW *PTILOTUS*.

By W. V. Fitzgerald.

Ptilotus (Trichinium) **fasciculatus**, sp. nov. Perennis, ramis sterilibus brevibus foliigeris; caulibus adscendentibus simplicibus; foliis inferne fasciculatis vel arcte approximatis superne remotis, lineari-teretibus mucronato-acutis glabris basi persistentibus; spicis terminalibus globulosis vel ovoideis rhachi albo-lanoso, bracteis bracteolisque æqualibus late ovatis mucronatis dorso carinatis tenuiter scariosis dilute stramineis; perianthio sæpe leviter incurvato, tubo breviter turbinato, segmentis rigidissimis ecostatis subviridibus extus dense et breviter plumosis apice subrubris glabris, segmentis exterioribus lineari-lanceolatis bi-tridentatis intus glabris, interioribus leviter brevioribus subacutis vel acutis intus infra medium dense albo-lanosis; staminibus duobus solum perianthio subæqualibus; filamentis basi breviter dilatatis sursum filiformi-teretibus, antheris conspicuis; ovario glabro breviter atque conspicue stipitato, stylo modice longe glabro manifeste excentrico.

Prope Cunderdin, Western Australia. Leg. W. V. Fitzgerald. Nov. 1907.

Radix glabra, crassa, lignosa. Caules 3–5 unc. alt. Folia 5–7 lin. long. Spicæ plerumque 9 lin. long. Bracteæ bracteolæque $1\frac{1}{2}$ lin. long. Perianthii 4–5 lin. long. tubus vix $\frac{1}{2}$ lin. long.

Allied to *P. roseus* F. Muell.; differing in being glabrous, in the shorter, simple flowering stems, very different foliage, shorter, equal bracts and bracteoles, &c. The foliage approaches that of *P. cæspitosus* F. Muell., but the flowers widely diverge from those of that species.

BIBLIOGRAPHICAL NOTE.

XLIX.—Patrick Browne's 'Natural History of Jamaica.'

In his admirable work on the *Civil and Natural History of Jamaica*, the first edition of which appeared in 1756, Patrick Browne describes a considerable number of species under new generic names. Many of these names have been adopted by Linnæus (*Systema*, ed. 10, 1759) and subsequent authors, but the method of citing them in various modern systematic works suggests that there is some confusion as to their exact status. For instance, in the *Kew Index* they are cited as of Browne—sometimes, but by no means generally, with the addition of the reference to a subsequent author. Another method of citation, that adopted in the Vienna List of *nomina conservanda*, is to insert the reference to Browne within brackets, followed by reference to a later author, thus—"*Trichilia* [P. Br. Hist. Jamaica (1756) 278] L. Syst. ed. 10 (1759) 1020." This form of citation implies (correctly) that Browne did not describe the genus, and that it was first published by Linnæus; the insertion of the reference to Browne's work is merely of bibliographical interest.

Browne published no genera; his descriptions are of species only. The genus name is printed in capitals in front of each species description, which is preceded by a number, 1, 2, 3, and so on, *e. g.* "SECHIUM 1. Foliis cordato-angulatis, racemis minoribus ad alas." His generic names are, in fact, precisely similar to those given by Linnæus in the *Species Plantarum* (1753), which stand from that date only by special legislation; see International Rules, Art. 38: "The mere indication of species as belonging to a new genus . . . . does not allow us to accept the genus as characterized and effectively published. An exception is made in the case of the generic names mentioned by Linnæus in the *Species Plantarum*, ed. 1, 1753, names which we associate with the descriptions in the *Genera Plantarum*, ed. 5, 1754."

It is therefore somewhat surprising to find that several of the *nomina conservanda* are included with reference solely to the presumed earlier names given by Patrick Browne. Thus *Cecropia* L. (1758), *Xylopia* L. (1759), *Weinmannia* L. (1759), *Mucuna* Adans. (1763), *Securinega* Comm. ex Juss. (1789), *Omphalea* L. (1759), *Lœtia* Loefl. (1758), *Stemodia* L. (1759), *Psychotria* L. (1759) appear in the List solely because they are presumably antedated by names starting from Patrick Browne and subsequently taken up by other authors, sometimes as recent as the late Dr. Otto Kuntze. These names may therefore be eliminated from the List, which (see Art. 20) was compiled to avoid changes in the nomenclature of genera occasioned "by the strict application of the rules of nomenclature." Under no recognized rule of nomenclature can the names as originated by Patrick Browne take precedence of or compete with subsequently published names. A list of *nomina conservanda* should be kept within limits as narrow as possible, and it is to be hoped that unnecessary entries will be omitted in later editions.

A. B. Rendle.

SOME LITTLE-KNOWN BRITISH BOTANISTS.

By James Britten, K.S.G., F.L.S., and G. S. Boulger, F.L.S.

(Continued from p. 62.)

Edwards, John (fl. 1768–95), F.S.A.
Edwards, William Frederic (1776-1842). Physiologist.
Edwards, Thomas (fl. 1800–45), F.L.S. Contrib. Encycl. Metrop.
Ellis, Robert (fl. 1700–4). In S. Carolina, 1700.
Evans, Elizabeth Mary (1865–1907).
Everett, Miss E. (fl. 1800?). Algologist.
Ewer, Samuel (fl. 1789-1808). Of Hackney. F.L.S. 1789.
Eyre, General J. (fl. 1851), R.A. Collected in Hong-kong.

Farquhar, Colonel W. (fl. 1815–22). Resident of Singapore.
Fennell, James H. (fl. 1840). 'Drawing-room Botany.'
Findlay, Captain (fl. 1792). Sent plants from Dominica to Rudge.
Fitton, Elizabeth and Sarah Mary (fl. 1817–66). Of Dublin.
Flintoff, Thomas (fl. 1789). Surgeon. Of Knoyton, Yorks.
Forby, Rev. Joseph (fl. 1801). Discovered *Salix Forbyana.*
Ford, John (fl. 1763–89), M.D., F.L.S. Nephew of John Ellis.
Forsyth, J. S. (fl. 1827). 'First Lines of Botany.'
Fox, John (or Foxe) (fl. 1695). Surgeon. Sent plants to Petiver.
Franklyn, George (fl. 1700). Apothecary. In Carolina.
Freeman Samuel (fl. 1841). Of Birmingham.
Furber, Robert (fl. 1724–32). Nurseryman, of Kensington.

Gairdner, Meredith (d. before 1840). M.D., Hudson's Bay.
Gardner Colonel Hon. Edward (fl. 1820). Collected in Nipal.
Gartside, Miss — (fl. 1803). Of Lancashire. Botanical artist.
George, Edward (d. 1900). Cryptogamist.
Gibbs, George (fl. 1634). Of Bath. Surgeon. Coll. in Virginia.
Glenie, Rev. S. Owen (fl. 1863-9), F.L.S. Chaplain, Trincomalee.
Gordon, Colonel — (d. 1797). Collected and drew *Stapeliæ.*
Gordon, Alexander (fl. 1793). Joint-author, 'Indig. Bot.'
Gordon, Alexander (fl. 1835–45). Gardener and collector.
Gordon, James (fl. 1756), M.D. Of Aberdeen.
Gordon, William (fl. 1832). Surgeon. Of Welton, near Hull.
Gotobed, Richard (fl. 1800–1805). Of Eton. F.L.S.
Gourlie, Robert (d. 1832?). Collected in Chile.
Green, Thomas (fl. 1816–20). 'The Universal Herbal.'
Griffin, W. (fl. 1815-20). Of South Lambeth.
Groult, — (fl. 1800–4). Correspondent of Sir J. E. Smith.
Groves, James William (fl. 1887-1901). F.L.S., 1887.
Gulson, Mrs. (fl. 1855). Of Exmouth. Algologist.

Hall, — (d. 1834). Colonel. Correspondent of W. J. Hooker.
Halle, Hughes R. P. Fraser (fl. 1842–69). 'Letters,...Botanical.'
Hamilton, William (fl. 1781–90). Professor of Botany, Glasgow.
Hammond, William (fl. 1842). 'Cat. of Orchidaceous Plants.'
Hanham, Frederick (fl. 1846-57). Of Bath.
Hardcastle, Lucy (fl. 1830). 'Elements of Linnean System.'

Hare, Richard (fl. 1810). Of Bath. Algologist.
Hart, J. (fl. 1825). Botanical artist.
Hawkins, Ellen (1854–68). Derbyshire ?
Hayes, Samuel (fl. 1794). Of Avondale, co. Wicklow. M.R.I.A.
Helfer (fl. 1838), M.D. Collected in Tenasserim.
Henderson, Logan (fl. 1787). Botanist to the Tsar.
Hibbert, William (fl. 1837), M.D. Army surgeon, Bombay.
Hill, Miss — (fl. 1800–30). Of Plymouth ? Algologist.
Hinds, Richard Brinsley (d. before 1861). Surgeon, R.N.
Hockin, John (d. before 1885). Of Dominica.
Holdsworth, J. H. (fl. 1842), M.D.
Horner, — (fl. 1800), M.D. Algologist. Collected in Japan.
Howison, William (fl. 1838), M.D. Lecturer on Bot., Edinburgh.
Hulme, J. R. (fl. 1842), M.D. Of Scarborough. Algologist.
Hussey, Mrs. T. J. (fl. 1847–55). Mycologist.

Ingram — (fl. 1866). Collected in Gambia.

Jacob, Rev. John (fl. 1835–7), LL.D. Of Devonport.
Jelly, — (d. before 1849). Of Bath.
Jorden, George (fl. 1842–63). Butler, of Bewdley.

Keddie, William (fl. 1844). Of Glasgow.
Kentish, Richard (fl. 1782–91), M.D. Edinb.

Leith, H. Andrew (fl. 1840-50), M.D. Collected in India.
Lindsay, A. K. (fl. 1833), M.D. Collected in Kumaon.
Lindsay, Archibald (fl. 1781), M.D. Edinb. 1781.
Lingard, John (fl. 1827). Writer on timber.
Lippold, Dr. D. I. F. (fl. 1840). Collected in Brazil.
Littlejohn, — (fl. 1830). Collected in Tasmania.
Livingstone, John (fl. 1800–24).
Livingstone, John S. (fl. 1860), F.R.Phys. Soc. Ed.
Long, Henry Lawes (fl. 1839). Contributor to Gard. Mag.
Long, J. (fl. 1857–9). ‘Indigenous Plants of Bengal.’
Longmire, J. B. (fl. 1814-26). ‘Plants of St. Petersburg.’
Lovell, George (fl. 1849). Gardener.
Lyon, P. (fl. 1816). Of Edinburgh. ‘Treatise on Trees.’

MacIntyre, Æneas (fl. 1825–60), LLD., F.L.S. 1825.
Mackay, John (fl. 1841–62). Druggist. Of Edinburgh.
Mackenzie, Charles (fl. 1830), M.D., F.L.S.
Mackenzie, Peter (fl. 1850–1874). Working-man botanist.
Maclagan, J. McGrigor (fl. 1851), M.D. Edinburgh ?
McNab, Robert (fl. 1842). Of the Bridge of Earn.
McWilliam, Robert (fl. 1818). ‘Essay on . . . Dry Rot.’
Mapplebeck, John E. (fl. 1895 ?). Pteridologist.
Mason, Nathaniel Haslope (fl. 1856–62). Collected in Madeira.
Mateer, William (fl. 1836-1846). Prof. Bot., Belfast.
Mathew, William (fl. 1793–1825). Of Bury St. Edmunds.
Matthew, Patrick (fl. 1831). Of Errol. ‘Naval Timber.’

(To be continued.)

SHORT NOTES.

Populus virginiana Foug.—The following note by Dr. Moss on a *Populus* sent to the Watson Exchange Club by Mr. A. R. Horwood is taken from the Report of the Club for 1910–11, p. 310:—"Not *P. monilifera* Ait. (1789) = *P. deltoidea* Marsh. (1785), which is very rare in Britain, even as a cultivated tree; nor is it *P. monilifera* Mich. fil. (= *P. monilifera* Loud.), which is the common 'Black Italian Poplar' of cultivation; but it seems to be *P. virginiana* Fougeroux (Mem. Soc. Agric. Par. 1787). I have not seen this description, but I think this is the plant intended by Continental writers (*e. g.* Ascherson and Graebner, Fl. Mitteleur.) by their *P. virginiana.* Some examples of it in Kew Gardens are named *P. marylandica*; but the description of '*P. marylandica* Bosc.' in Lamarck's Encycl. Suppl. iv. does not fit the plant. This poplar does not appear in any of the British floras or lists; however, it is subspontaneous in several fenny places in Suffolk, and this, I suppose, must count as its first British record. It is sometimes planted, as on the roadside in West Suffolk between Barton Mills and Icklingham, also in grounds and gardens, as in Cambridge. The following poplars belonging to this group are usually confused by British botanists:—(1) *P. nigra* Linn. (indigenous in southern and eastern England); (2) *P. deltoidea* Marsh. (very rarely cultivated in Britain; indigenous in N. America); (3) *P. canadensis* Moench (the 'Black Italian Poplar'; commonly cultivated; origin unknown); and (4) *P. virginiana* Foug. (cultivated; origin unknown). *P. virginiana* is usually (? always) a pistillate tree; *P. canadensis* is usually (? always) a staminate tree. The above three introduced poplars have 0, 1, or 2 glands at the base of each lamina: these glands are absent in *P. nigra.* *P. deltoidea* is slightly ciliate at the margin of the lamina. *P. canadensis* (the male tree) has terminal leaves which are decidedly less acuminate than those of *P. virginiana* (the female tree)."

Utricularia ochroleuca R. Hartman.—During last October Professor Hugo Glück, of Heidelberg, spent a night at my house, and looked through a good many of the aquatic plants in my herbarium. To our surprise, he found that most of my sheets labelled *U. intermedia* were typical *U. ochroleuca*; as a rule, only barren material is present, but the foliage of these two species is quite different enough to separate them readily. They are from the following stations, the numbers referring to Watson's vice-counties:—9. Dorset: Morden Decoy (flowering), and Talbot Heath, Bournemouth, *E. F. Linton.* 88. Mid-Perth: Moorland above Crianlarich, at 700 ft. 98. Argyle: Pools and lochs on Rannoch Muir, near Kingshouse, above 1000 ft. 106. E. Ross: Hill-bog near Garve, at 900 ft. (one flower present), *W. A. Shoolbred & F. T. Marshall.* 108. W. Sutherland: Peaty lochan near the eastern base of Quinag, at about 1000 ft.; moorland pools, west of Loch Hope, not much above sea-level. 112. Shetland: Pools by Loch of Spiggie, Dunrossness, *W. H. Beeby*. A sheet from Lochan Feoir, near Inchnadamph, v.-c. 108, referred by Professor Trail to *U. ochroleuca* (which he considered to be *U. intermedia* × *minor*), Prof. Glück says is not that, but either barren *U. minor* or *U. Bremii*; it is very stout for the former, with considerably larger bladders, and in habit closely resembles Continental *Bremii* which I have seen. I have no Scottish specimen of true *U. intermedia*; on the other hand, Prof. Glück saw a good deal of that in West Ireland last year, but no *U. ochroleuca*. The occurrence of *U. ochroleuca*—mainly a northern species—so far south as Dorset was quite unexpected.—EDWARD S. MARSHALL.

OROBANCHE PICRIDIS Schultz IN HERTS.—In a collection of plants which recently came into my possession, and was formed by members of the Blake family of Danesbury, near Welwyn, is a good specimen of the above, which is not on record for Herts. It was labelled *O. minor* and collected at Welwyn in 1821.—G. CLARIDGE DRUCE.

REVIEWS.

A Monograph of the Mycetozoa: a Descriptive Catalogue of the Species in the Herbarium of the British Museum. By ARTHUR LISTER, F.R.S., F.L.S. Second Edition, revised by GULIELMA LISTER, F.L.S. Printed by order of the Trustees of the British Museum. 1911. 8vo, pp. 302. 201 plates and 56 woodcuts. Price £1 10*s*.

OF all the groups of organic beings there is perhaps none more interesting to the biologist than that of the Mycetozoa. Though generally classed as vegetables they have a relationship with the lower forms of animal life, as De Bary endeavoured to express in the word Mycetozoa. Like troops of nomads they wander across the boundary line between the two kingdoms.

The peculiar method of their reproduction by swarm spores uniting into a plasmodium separates them from the Fungi and all the other groups to which they might otherwise approximate; and the variety and beauty of their sporangia make them highly attractive in the cabinet and under the microscope. Again, the extreme simplicity of their structure and the facility with which they perform all the functions necessary to life seem to afford a vivid illustration of Hunter's well-known doctrine that life precedes organization.

Of this group, the acknowledged text-book, at least for all English students, has hitherto been the first edition of Mr. Lister's monograph, published in 1894. We now welcome a second edition from the hands of his accomplished daughter, Miss Gulielma Lister, embodying the results of the studies of her father until his death in 1908, and of her own studies from the very commencement of his labours. This work is a most admirable one, and seems to me to be an almost perfect specimen of what a systematic monograph on any group of organisms ought to be. We have in the first place an introduction, dealing with the general character and life-history of the group; then comes a synopsis of the orders and list of the genera; then we have prefixed to each order a key to the genera, with woodcuts illustrative of each genus; then to each species is devoted an elaborate description with a reference to its synonyms and literature, together with a description of its habitat. The student is thus guided in the most gentle and illuminating way through the intricacies of the subject.

The labour involved in the revision of the work by Miss Lister has been greatly increased by the adoption of the Rules of Nomenclature which were revised in 1905; so that whereas in the first edition the custom was followed by which the first authentic specific name published under the genus in which the species then stood took precedence of all others, in the new edition the rule has been adopted that the earliest specific name, under whatever genus it may have been published, is to be used. Furthermore, the rule was adopted that the starting point of these names as well as for those of the genera of Mycetozoa should be the *Species Plantarum* of Linnæus, published in 1753. The result of these two rules has been to involve an enormous amount of labour in examining the literature bearing upon each species, a labour painful not only from its magnitude but from its destructive character. Some of the old and familiar genera, such as *Chondrioderma* and *Spumaria* have disappeared, and many of the most familiar species appear under most unfamiliar names, so that the change is something of a shock to those who have been accustomed to the use of the first edition. Every naturalist knows that, as a sense of affection grows up towards the objects of his study, so the very names of those objects have the association of old friendship and are loved almost as the objects themselves. We are sure that Miss Lister must have suffered much from the disruption of old associations.

The comparison of the two editions may throw some light upon the advance made in the study of this group. The introduction dealing with the life-history of these organisms is substantially unchanged, a fact which seems to indicate that no great advance has been made in this subject. On the other hand, the addition of something like sixty species to the one hundred and eighty or thereabouts of the first edition shows how much progress has been made in the recognition of new forms, an advance probably not a little owing to the first publication of this book and to the labours of its authors.

There have been added to the contents of the first edition an additional list of synonyms, a list of species to be discarded, a bibliography, and a glossary: the magnitude of the material to be dealt with may be gathered from the fact that the bibliography occupies no less than eight pages. Another point of difference between the two editions is the presence in the new one of one hundred and twenty coloured plates, reproduced by the three-colour process, for which the reader is largely indebted to the generosity of Miss Lister. The plates, both coloured and uncoloured, are of great beauty.

There is only one suggestion which I should venture to make, *viz.*, that in a future edition the index of the plates should be consolidated with the index of the text, so that one reference would guide to both parts of the book.

The work as it now stands is well worthy of its authors, members of a family which in three successive generations has given to the Royal Society four Fellows, one of them a President.

EDWARD FRY.

Froplanterne (*Spermatofyter*). Af Dr. EUG. WARMING. 8vo, pp. 467, with 591 text-figures. Gyldendalske Boghandel, Copenhagen & Christiania. 1912. Price 10 Kroner.

DR. WARMING'S *Handbook of Systematic Botany* is well known to English students in the translation edited by Prof. M. C. Potter. It is an admirable exposition of the orders and families of plants, and has been of special value as presenting an account of the seed-plants in accordance with the views more generally accepted by modern systematists. It is highly probable that these views will undergo modification, but much remains to be done before systems based on the general lines laid done by Eichler, such as are those elaborated by Dr. Warming and Dr. Engler, can be set aside by arrangements more nearly expressing the facts of phylogeny.

In his new work, the publication of which coincides with his retirement from active service, Dr. Warming has elaborated the account of the seed-plants given in the earlier work. The first sixty-seven pages are devoted to a phylogenetic introduction—a comparative study of the life-history of the Mosses and Ferns and the relationship to these of the higher plants, especially in connection with the development of the gametophyte stage. This portion is profusely and helpfully illustrated by figures after Chamberlain, Webber, and other approved workers on this phase of morphology. Then follows a brief systematic treatment of the Gymnosperms (pp. 68–83) under four classes—Cycadinæ, Ginkgoinæ, Coniferæ, and Gnetinæ; of which the Coniferæ are subdivided into three orders—Taxales, Pinales, and Cupressales. The remainder of the book is a systematic account of the Angiosperms arranged under the two classes—Monocotyledons and Dicotyledons.

The treatment is similar to that of the *Handbook*, but fuller. There are, however, some differences in the arrangement of the orders or groups of families. Under Monocotyledons nine orders are recognized, as compared with seven in the earlier work; this is due to the breaking up of the older Spadicifloræ into three—Pandanales, Palmales, and Arales. The sequence remains the same except that Scitaminales is now placed after Orchidales at the end of the series.

Dicotyledons, as before, are considered under the subclasses Choripetalæ and Sympetalæ, the sequence of the former being marked by an achlamydeous or monochlamydeous floral series and a heterochlamydeous floral series, while the existence of two strongly marked groups in the second is indicated by their subdivision into Pentacyclicæ and Tetracyclicæ. Dr. Warming is here working on similar lines to those developed in his former book, but in the nomenclature and arrangement of the orders some changes are noticeable. Thus the series now begins with the Verticillatæ (*Casuarineæ*), followed by the Salicales and the other amentiferous orders; Proteales follows Polygonales, in which *Piperaceæ* are included; while the Hysterophyta, which in the earlier work came at the end of the Choripetalous subclass, now appear, as Santalales and Aristolochiales, at the end of the achlamydeous and monochlamydeous series. It will be seen, therefore, that there is a nearer approach to the sequence adopted by Dr. Engler. To some extent the same remark applies to the heterochlamydeous series, though a larger number of orders is recognized than by Dr. Engler, and the Cactales are still placed early in the series, next, in fact, to Centrospermæ, the starting-point. Engler's large order Parietales is also placed earlier in the series, immediately after Sarraceniales, and is represented by two orders, Parietales and Guttiferales. In the subclass Sympetalæ, while the treatment of the Pentacyclicæ is unaltered, the families of the Tetracyclicæ have undergone some rearrangement. The older Nuculiferæ is now broken into two orders—Boraginales and Verbenales (*Labiatæ* and *Verbenaceæ*), and Personatæ are placed between them. *Oleaceæ* and *Salvadoraceæ* are also separated as a new order—Oleales—from the Contortæ; while, on the other hand, *Dipsaceæ* are included in Rubiales, and Campanulinæ in the Synandreæ, which, as before, concludes the series. The descriptions of the orders and families follow the plan adopted in the *Handbook* from which the excellent figures, with some additions, are also taken.

A. B. R.

Exkursionsflora von Java umfassend die Blütenpflanzen mit besonderer Berücksichtigung der im Hochgebirge wildwachsenden Arten. Bearb. von Dr. S. H. Koorders. Bd. i. Monocotyledonen. 8vo, pp. xxiv, 413; 7 plates and 30 text-figures. Bd. ii. Dicotyledonen (Archichlamydeæ). Pp. 742; 7 plates and 90 text-figures. Jena: Fischer. Price 24 Marks; 36 Marks.

It is more than fifty years since the publication of Miquel's *Flora Indicæ Batavæ*, but this still remains the only account of the phanerogamic flora, as a whole, of the Dutch East Indies. In spite of the fact that several of the groups of flowering plants have been in recent years critically worked out, there is no modern general account of the flora of the island of Java. Dr. Koorders seeks to supply this deficiency by the present work, which takes consideration of all the seed-plants which are found wild, naturalized, or as garden escapes, or which are extensively cultivated in Java and the directly associated islands.

The nomenclature and arrangement of families and genera is, with few exceptions, that of Engler & Prantl's *Pflanzenfamilien* and Engler's *Pflanzenreich*. In the limitation of species, where no more recent monograph was available, the author has followed, as far as possible, our Indian and Colonial floras, especially Hooker's *Flora of British India*. Besides his own extensive herbarium, the result of many years' collecting in the island, Dr. Koorders has examined the rich collections from the East Indies at Leiden, and has also visited a few other important European herbaria. He has also received assistance in certain orders from well-known systematists.

The arrangement of the work recalls that of Dr. Thonner's *Die Blutenpflanzen Afrikas*. It opens with a table for the determination of families; based partly on that elaborated by Dr. Thonner and partly on Dr. Koorders's *Zakflora von Java*. The table, which includes all the families of seed-plants, occupies fifty pages, and the difficulty in working out a satisfactory family clavis is illustrated by the great number of times which the names of some of the larger or more variable families occur. The account of the Gymnosperms precedes that of the Monocotyledons in the text. The section Gymnosperms is very poorly represented in Java; there are two Cycads, five species of *Podocarpus*, an *Agathis* (in cultivation only), and six species of *Gnetum*.

The method is as follows. Under each family there is a description, this is followed by a key to the tribes or genera. Each genus is then described in turn, and a key to the species follows. The species key contains a good deal of information, including a diagnosis of the plant, references to synonymy, distribution in Java, citation of numbers in Koorders's herbarium, and native names. The book is in fact a descriptive flora, with the information arranged in the form of a key. In some genera a monographic treatment is also adopted. Thus in *Podocarpus* the key is supplemented by a descriptive account of the five species, three of which are illustrated; and the *Pandanaceæ* are treated in still greater detail. The account of the latter family is based on the author's phytogeographic and systematic revision of the *Pandanaceæ* of Java, and includes several pages dealing with geographical distribution, &c.; there are also long descriptions of each species, and in many cases sketches illustrating habit. The arrangement of the genera of grasses is that adopted by Hackel in the *Pflanzenfamilien*; while the account of the Orchids is based on J. J. Smith's monograph (*Die Orchideen von Java*). It will thus be seen that there is necessarily some difference in value in the treatment of different families. There is evidently much to be done in working out the freshwater flora of the island. For instance, six pond-weeds are mentioned, but except the endemic

Potamogeton javanicus, they are cited as only probably occurring. Two species of *Najas* are mentioned—*N. graminea*, which has been found once, and *N. marina* (wrongly quoted as *N. major*), which "probably occurs"; Dr. Koorders has omitted *N. falciculata* A. Br., a plant collected in Java by Horsfield, and duly recorded in the monograph in the *Pflanzenreich*.

Similarly, in the second volume, some families, such as *Casuarinaceæ*, *Piperaceæ*, and in part *Rosaceæ*, are treated monographically; while in others, such as *Leguminosæ*, *Euphorbiaceæ*, and, in fact, the majority, there is nothing beyond the (very full) clavis treatment. Under *Casuarina* a useful account is given of the occurrence, distribution, and general character of the Javanese species, of which there are two, *C. montana*, with two varieties, which forms great forests, and is known elsewhere only from Timor and Bangka, and the widely spread *C. equisetifolia*, which is a strand-plant in West Java. In the elaboration of the *Piperaceæ*, which are treated somewhat exhaustively, the author has the assistance of M. Casimir de Candolle. The genus *Quercus*, with twenty-five species, is also worked out in detail, with useful figures of the fruits.

The photographic plates illustrate phases of vegetation in the island, and there is also a coloured plate of *Trichosporum pulchrum*, copied from the *Botanical Magazine*, for which it is not easy to account. The text-figures, excepting those in the accounts of *Podocarpus*, *Pandanus*, and a few similar cases, appear very spasmodically, and it is difficult to understand their distribution. But these are minor points and do not detract from the great value of Dr. Koorders's contribution to a systematic knowledge of a varied and interesting flora. We trust that the remaining volume, which we note is promised for May of the present year, may not be unduly delayed; a working handbook on the flora of Java will be a great boon to the systematist.

A. B. R.

Types of British Vegetation. By Members of the Central Committee for the Survey and Study of British Vegetation. Edited by A. G. Tansley, M.A., F.L.S., University Lecturer on Botany in the University of Cambridge. With 36 plates and 21 figures in the text. Cambridge University Press. Pp. xx, 416. Price 6s. net.

Well may Mr. Tansley confess in his preface to this excellent little work that the title chosen by himself and six other energetic workers in ecology is "somewhat ponderous," so that they are fain to shorten it to "the British Vegetation Committee" or to "the Central Committee." The Committee, in spite of its title, is, however, to be congratulated on this work which it has—with some outside assistance—accomplished, and on having chosen in Mr. Tansley a most efficient editor; whilst English botanists as a body are, we think, to be equally congratulated on what is practically a new intensive method of study applied to our flora. The editor leads off with a chapter on the Units of Vegetation, based upon Dr. Moss's well-known paper. Then we have two chapters on the conditions of vegetation in the British Isles as regards physical characters and climate and soils, which, though referring, of course, to the country at large, may remind some of us of what was in 1869 the novel detail of the Introduction to Trimen and Dyer's *Flora of Middlesex*. The soils of Scotland are treated by Dr. W. G. Smith, whose brother Robert may be termed the founder of British ecological study, and those of Ireland by Professor Grenville Cole, the rest of the part being by Mr. Tansley. The bulk of the volume consists of descriptions of the fourteen plant-formations recognized as British, with their sub-formations and associations. Here we have Scottish Heaths, the Grass Moor Association and Scottish Arctic-alpine Vegetation, with special reference to Ben Lawers, described by Dr. Smith ; the Pennine Region and the Sub-formation of the Older Limestones, by Dr. Moss ; the Upland Moors of the Pennine Chain, also by him, in conjunction with Mr. F. J. Lewis ; the British Freshwater Phytoplankton, by Professor G. S. West, indisputably our greatest authority on the subject ; the River-valleys of East Norfolk, by Miss Pallis ; the Lowland Moors of Lonsdale, the Valley Moors of the New Forest, and the Salt-marsh formation of the Hampshire Coast, by Mr. W. M. Rankin, who is also part author with Mr. Tansley of the chapter on " the sub-formation of the Chalk " ; and the Maritime formations of Blakeney Harbour, in Norfolk—is there not also a western Blakeney ?—by Professor F. W. Oliver. When these interesting areas have been accounted for, there remains a large number of associations which the editor has himself described. Under each association full lists of dominant species are given, and the individual relations of their environment are discussed, while a special feature of the work is the tracing of the transitions from one formation to others. These are represented by diagrams and an ingenious " genetic " table at the end of the volume, while numerous sketch-maps elucidate the topography.

Valuable as is the text, however, its value is, in our opinion, even surpassed by that of the illustrations. One cannot help sometimes regretting that ecology, like golf, has loaded itself with an enormous mass of terminology ; and in many books we see photograph after photograph reproduced in which the individual species are absolutely unrecognizable. It is difficult to see in what degree such photographs add anything to the verbal descriptions. It is, however, quite another matter with the majority of the illustrations in this book. They are mostly landscapes, not attempts to photograph plant-societies at close range : most of them are extremely small, about four inches by three, and they are process-blocks, so that a magnifying-glass brings out but little detail not visible to the naked eye. But, whatever size were the original photographs, they have been so admirably selected, lighted, and reproduced that almost all of them do tell their own story of dominant species. They alone would be worth the price of what is certainly a most inexpensive and fascinating volume.

G. S. Boulger.

Vocabulaire Forestier Français, Allemand, Anglais. Par J. Gerschel, revu par W. R. Fisher. Cinquième Edition. Oxford: Clarendon Press, 1911. Pp. viii. 192. Price 5s. net.

Seldom are we more liable to feel the curse of Babel than when dealing with the technicalities of any special science or art. Then it is that the ordinary dictionary too often fails us. The fact that this vocabulary of forestry by the Professor of English and German at Nancy has reached a fifth edition suffices by itself to show the need of such a work, and its revision by one so competent both as linguist and as practical forester as the late Prof. Fisher, the translator of Schimper's *Plant-Geography* and of two volumes of Dr. Schlich's *Manual of Forestry*, not only testifies to his recognition of its value to English forest-students, but also secures its general accuracy. A melancholy interest attaches to it in that it was the last work upon which he was engaged. In fact, once or twice, as when we read of "Cedar of Libanon," we doubt whether it had really received Prof. Fisher's final revision before his death. We have seldom found it fail us when we have consulted it, and a fourth language, *viz.* American, is practically included with the three leading tongues of Europe. Clear type, rounded corners, and a serviceable binding combine to render it a handy pocketable volume.

G. S. Boulger.

Zur Phylogenie der Primulaceenblüte. Studien über den Gefässbündelverlauf in Blütenachse und Perianth. By Dr. Salvator Thenen. Pp. iv, 131; 201 figs. Jena: Gustav Fischer. 8 Marks.

Such a wide field is open for research in the detailed structure of floral forms and its significance that any material addition to our knowledge in this regard is most surely welcome, particularly when it throws any light upon the obscure problems of phylogeny.

The primulaceous flower is notorious for the special difficulties which it presents; it has been made in consequence the object of particular attention in the past, and the general conclusions and outstanding problems in this connection are widely known. The title of the volume before us is thus likely to prove an attractive one to many, and for the same reason, perhaps, we have been led to expect too much from its perusal.

In the lower portion of both calyx and corolla of *Primulaceæ* two sets of vascular strands arise; one set (*Hauptgefässbündel*) passes medianly into the lobes, and the other (*Nebengefässbündel*) forks at the space between adjacent lobes, a branch of the fork passing into each. Van Tieghem has suggested that the five bundles of the latter set which alternate with the median systems of the corolla-lobes represent the conducting systems of an ancestral whorl of antesepalous stamens. The main object of Dr. Thenen's research is to refute this suggestion, and the bulk of the book is devoted to the records of detailed observations upon the course of the bundles in question in the case of nearly every genus of *Primulaceæ.* The figures, which are diagrammatic and clear, are distributed over nine plates. The author concludes not unconvincingly that Van Tieghem's hypothesis was erroneous, and by so doing adds another warning against the pitfalls of apparent evidence (staminodes, monstrosities, &c.) for the existence of ancestral members now completely suppressed.

There is interesting matter relating to the effect of environment upon the structures under examination, and the details have been investigated with evident care, but the book cannot be regarded as a serious addition to the literature of plant-phyletics as its first title might seem to imply; it is better characterized by its second name.

H. F. Wernham.

BOOK-NOTES, NEWS, &c.

Sussex loses an enthusiastic working botanist in the death, on Feb. 10th last, of Thomas Hilton, of Brighton. He was born in 1833 in that town, and resided there all his life. Making but few excursions into other parts of England, but very thoroughly exploring his native county, a trip taken to Switzerland and a visit to Normandy (in company with the Rev. E. Ellman) were red-letter events in his life and long remembered for the wealth of fresh material they added to his knowledge and herbarium. As Hon. Curator to the Brighton Museum, the herbarium there (containing, amongst others, the collections of F. C. S. Roper) was under his care, and, in 1894, he initiated at the Museum the exhibition of living wild flowers to encourage others to investigate the local flora and for instructive purposes. This exhibition was always most attractive to visitors, and was continued throughout the summer months. Hilton's name will be remembered in connection with an interesting Water Ranunculus of hybrid origin, *R. Lenormandi* × *peltatus*, to which the name *R. Hiltoni* was given by the Messrs. Groves in this Journal for 1901, 121, plate 420. Amongst other interesting discoveries made in Sussex may be mentioned *Peucedanum palustre* in 1899 (with Mr. G. C. Druce), *Silene dubia* (Journ. Bot. 1905, 127), *Sagina Reuteri*, and *Prunella laciniata* (in 1904). His herbarium, containing a large proportion of the plants occurring in Sussex, has been presented to the British Museum (South Kensington). Mr. Hilton was a member of the Society of Friends.—C. E. S.

At the meeting of the Linnean Society, on February 15th, Mr. Robert Harold Compton read a paper entitled "An Investigation of the Seedling Structure in the *Leguminosæ*," of which the following is an abstract. The tree habit is held to be primitive in the *Leguminosæ*, the herbaceous habit derived: these characters are correlated respectively with the production of large and small seeds, and therefore of large and small seedlings. A stable type of tetrarchy is correlated with large size of seedling and is therefore probably primitive. Reduction in the size of the seedling brought about an unstable tetrarchy passing into triarchy and diarchy in connection with the supplementary relation existing between the inter-cotyledonary protoxylems and the first plumule traces. Other types of symmetry are also derivable from tetrarchy. The diameter of the axis is the most important factor in determining the level of transition: low transitions being characteristic of massive, high transitions of slender hypocotyls. Since both the type of symmetry and the level of transition are so clearly related to the size of the seedling, it appears that, with certain possible exceptions, these anatomical features are not likely to be of more value in solving phytogenetic problems than the size-characters themselves.

Messrs. W. Heffer & Sons, of Cambridge, have in the press, and will shortly publish, a Monograph on the British Violets by Mrs. E. S. Gregory, the outcome of more than a quarter of a century's special attention to the *Nominium* section of *Viola*. The volume will be illustrated with both line and half-tone blocks.

The seventieth birthday of Professor Warming, who has retired from the Botanic Garden at Copenhagen, has been celebrated by the production of a handsome volume entitled *Biologiske Arbejden*, which contains a series of memoirs by his friends. French, German, Dutch, Danish and Swedish botanists have contributed papers: of these four are in English—that by F. Borgesen on the algal vegetation of the lagoons in the Danish West Indies; that by Carl Christensen on a natural classification of *Dryopteris*; that by L. K. Rosenvinge on the hyaline unicellular hairs of the *Florideæ*; and that by O. Paulsen on the plankton on a submarine bank.

The botanical article in the *Journal of Genetics* for February is an interesting account by Mr. A. W. Hill of the history of *Primula obconica* Hance—published in this Journal for 1880, p. 234—under cultivation. The plant has already shown remarkable variation in the colour and size of the flowers and in the fimbriation of the corolla segments; a double-flowered form and hybrids with *P. sinensis* are also discussed. The paper is illustrated by two excellent coloured plates.

A new edition, much enlarged, of Mr. G. Claridge Druce's *Flora of Oxfordshire* will shortly be published by the Clarendon Press.

The Annual Report of the New Jersey State Museum occupies 19 pages of the volume so entitled, the remaining 809 being devoted to an enumeration of *The Plants of Southern New Jersey*, by Mr. Witmer Stone, with especial reference to the flora of the pine barrens and the geographical distribution of the species. So far as we can judge, this is very carefully and usefully done. The enumeration is prefaced by an interesting essay giving the history of the knowledge of New Jersey botany and a general summary of the botany of the pine barrens. The flora is not descriptive, but for all the larger genera full keys to the species are given, and interesting ecological and geographical notes are scattered all through the book. There are 129 plates, many of them containing several species: we fear the specimens depicted are in many cases too fragmentary to be useful. This applies especially to the figures of grasses, rushes, and allied plants, some of which—*e. g.* the fourteen single spikes of as many species of *Eleocharis*, figured (with four other plants) on plate 17—appear to us to serve no useful purpose. The figures from photographs from actual growing specimens are interesting; those from water-colour drawings by Mr. H. E. Stone undoubtedly lose much in the half-tone reproductions, and his line-drawings are hard: nowhere do we find any dissections. The author has been working at the flora since 1889, and his volume embodies a vast amount of information.

The Journal of the College of Science of the Imperial University of Tokyo (xxxii. part 1) is devoted to a *Revisio Aceracearum Japonicarum*, by G. Koidsumi. Twenty-nine species are described, many of them—*e. g. A. japonicum*, *A. pictum*, and *A. palmatum*—with numerous varieties, subvarieties, and forms. Three species are new—*A. Morrisonense* Hayata, *A. rubescens* Hayata, *A. shirasawanum* Koidz. The monograph is illustrated by thirty-three excellent plates, as well as by woodcuts in the text.

Mr. James Saunders contributes to the *Transactions of the Hertfordshire Natural History Society* (vol. xiv. part 2) an interesting paper on the distribution of the Mycetozoa in the South Midlands. He gives additional records for Herts, Beds, Bucks, Middlesex, and Essex, a table showing the species which have been recorded for these counties, the numbers being respectively 66, 104, 43, 27, and 74; the total number of species for the whole area is 108. The large proportion recorded for Beds is of course due to Mr. Saunders's own observations in that county; the four not recorded for Beds are *Badhamia populina* (Essex), *Physarum psittacinum* (Herts and Bucks), *Cribraria violacea* (Bucks), and *Trichia favoginea* (Middlesex).

The Agricultural Journal of the Union of South Africa for February gives an account of a vegetable pest which is causing much trouble, and for the eradication of which no satisfactory method has so far been discovered. This is *Opuntia pusilla*, a plant of which was thrown from a garden into the Kaga river in

1874, and at once spread down to the river's mouth, and is now seriously affecting Uitenhage, Stockenstrom, and numerous other districts. Every fragment of the plant produces a new one, so that unless its destruction is carried out with the greatest possible care, the piling up for destruction with arsenite of soda—the most approved method—may succeed in further distribution of the plant.

Dr. Trelease, who has just retired from the directorship of the Missouri Botanical Garden—a post which he has occupied since its foundation in 1889—is continuing his series of papers on *Agave*. The last (22nd) report of the Garden contains papers by him on the Agaves of Lower California, with fifty-four plates, and revision of the group *Applanatæ* with twenty-seven plates: a number of new species are described. It is unnecessary to point out how greatly the value of these papers is enhanced by the liberal scale on which they are illustrated.

On p. 30 we noticed a recent adaptation of Johns's *Forest Trees of Britain*, published by Messrs. Routledge: we now receive from the S.P.C.K. a new (the tenth) edition of the work itself, edited by Mr. Boulger (price 6*s*. net.), who also contributes a preface. Although first issued more than forty years ago, it remains the most useful and comprehensive introduction to its subject from a popular standpoint; we regret, however, that the publishers have not seen their way to reset the book and produce it in more modern form. The illustrations in the text are often feeble, and the sixteen "coloured"—*i. e.* printed in green—plates added to this reissue leave a good deal to be desired. But it is a useful book, and would form an excellent prize in schools where the study of natural history is encouraged.

We regret that pressure on our space has hitherto prevented our giving extracts from the *Report* (the 27th) *of the Watson Botanical Exchange Club* for 1910–11. The Report contains much matter of more than usual interest, and includes a plate (from the forthcoming *Cambridge British Flora*) of a *Fumaria* labelled "*F. major* Badarro" with which Mr. Pugsley deals in his monograph now appearing as a Supplement to this Journal. The notes on specimens of critical genera are contributed by specialists on these plants—on *Viola* by Mrs. Gregory, on *Rubus* by the Rev. W. Moyle Rogers, on Roses by Major Wolley-Dod, on *Salicornia* by Dr. Moss, whose note on *Populus* we reproduce on p. 132; numerous observations from Mr. Marshall, Mr. Arthur Bennett, Mr. C. E. Salmon and Mr. F. H. Davey occur throughout the Report, to which we may recur later.

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(PUBLISHED MONTHLY.)

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Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains. In 1896 it became necessary to increase the size of the Journal, owing to the number of papers sent for publication: the number of plates was at the same time augmented.

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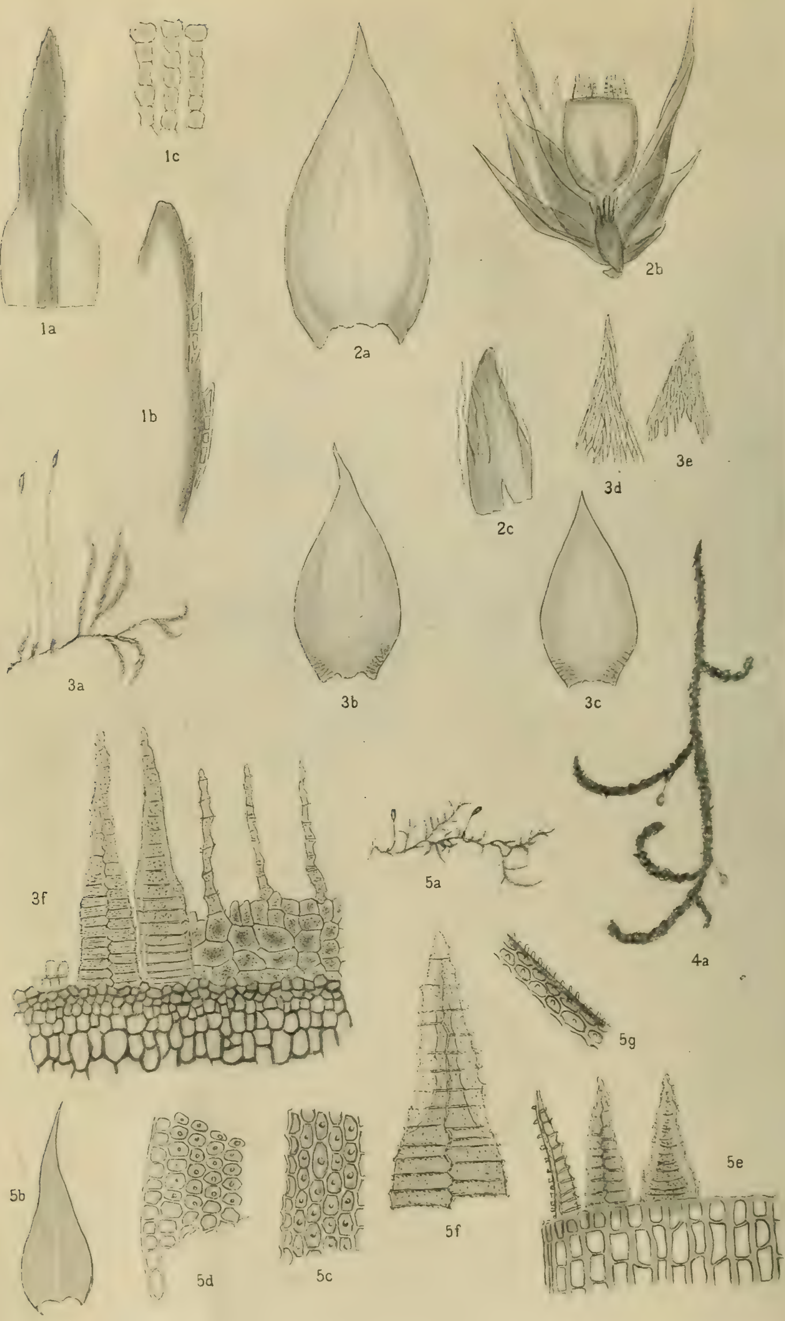
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(Plate 517.)

In this article I continue the study of mosses received from various parts of India (*cf.* Journ. Bot. 1911, p. 137). Since the publication of the last article a further small collection made by Mr. C. E. C. Fischer, in the Nilgiris, has come to hand, and a considerable number of mosses collected by Mrs. F. Roper, in the spring of 1911, about Darjeeling have been placed in my hands for study by Rev. C. H. Binstead.

Before proceeding with these I should add that, in describing the new genus *Hyophilopsis* (*op. cit.* p. 137), reference should have been made to the genus *Beccaria* C. Müll., doubtfully and provisionally reduced by him in the *Genera Muscorum Frondosorum*, and treated by Brotherus as a section of *Pottia* (which includes also *Hyophila*, *Hymenostylium*, &c., in C. Müller's arrangement). An examination of the specimens of *Beccaria* in the British Museum shows that it closely resembles *Hyophilopsis*, but differs in one or two important and essential characters; the peristome is wanting, not rudimentary as in *Hyophilopsis*, and the papillæ of the leaves are not on the face of the cells, but consist of coarse tubercles on or near the cell divisions, giving a remarkably rugose and striking appearance to the leaf. I may add that in a later gathering of *Hyophilopsis entosthodontacea* received from Mr. Sedgwick (No. 119), the papillæ are very sparse and often wanting.

Bartramia norvegica (Gunn) Lindb. Darjeeling, leg. Mrs. Roper (Nos. 44, 63), c. fr.

Philonotis imbricatula Mitt. Attapadi Hills, Coimbatore, alt. 3100 ft,, Sept. 1910, with *Brachymenium Fischeri* Card. & Dixon; leg. Fischer, st.

P. heterophylla Mitt. Purandhar, Poonah District, May, 1911; leg. Sedgwick (No. 129), st.

P. revoluta v. d. Bosch. & Lac. Lonavli, Western Ghats, Sept. 1908 (No. 8), st.; walls and banks, Mahableshwar, Western Ghats, 1909 (Nos. 53, 59), st.; all leg. Sedgwick.

P. longicollis (Hampe) Mitt. Darjeeling, leg. Mrs. Roper (Nos. 45, 50, 56, 57), c. fr.

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Oligotrichum semilamellatum (Hook.) Mitt. Darjeeling, leg. Mrs. Roper (Nos. 51, 65), c. fr.

Pogonatum aloides (Hedw.) Beauv. Shady bank, Mahableshwar, Jan. 1909, leg. Sedgwick (No. 38), c. fr. Det. Broth.

P. Junghuhnianum (Dz. & Mb.) Bry. Jav. Near Galle, Ceylon, Mar. 1898; leg. J. H. Darrell (No. 131), c. fr. The marginal cell of the lamellæ in transverse section is flattened and often emarginate. The capsule is distinctly ribbed when fresh, and plicate when dry and old, as figured and described in the Bry. Jav. Several of the Indian specimens I have seen under this name have the capsules smooth. Other species of *Pogonatum* appear to exhibit the same dimorphism in the capsule. If this is admitted, together with the liability of the terminal cell of lamellæ of *P. aloides* to the variation pointed out by Salmon (Journ. Linn. Soc. Bot. xxxiv. 463), and the well-known polymorphism of this and *P. subrotundum* as to general height, length of seta, and outline of capsule, it appears evident that several of the Indian species are founded on unstable characters, and a large and rather welcome reduction of species may be ultimately looked for.

Var. INCURVUM Bry. Jav. Attapadi Hills, Coimbatore, alt. 2500 ft., Oct. 1910, leg. Fischer (Nos. 7, 8), c. fr.

Pogonatum papillosulum Card. & Dixon, sp. nov. (Tab. 517, fig. 1.) Fusco-viride, sat conferte cæspitosum. Caulis simplex vel sub perichætio innovans, *2–4 cm. altus*, rigidiusculus. Folia sat conferta, humida erecto-patentia, sicca *fortiter incurva vix contorta, subrigida ;* 3–4 mm. longa, e basi brevi subito in laminam lanceolatam latiusculam angustata, apice acuto, marginibus nunc obscure nunc argute per partem folii dimidiam superiorem dentatis; costa valida rufa percurrens, dorso prope apicem plusminusve argute *dentibus sublamellosis* dentata; cellulæ laminæ parvæ, incrassatæ, 10–14 μ latæ, subquadratæ, ad basin dilatatam pellucidæ, *quadratæ vel breviter rectangulares*, infimæ tantum elongatæ (3 : 1 vel 4 : 1). Lamellæ 25–35, dense confertæ, totam fere laminam obtegentes, sectione transversa *e 5–7 cellulis instructæ, cellula terminali majore, dilatata, sæpius depressa vel emarginata, minute sæpe obscure papillosula.* Dioicum; plantæ masculæ densius confertæ, breviores, foliis brevioribus, rufescentibus ; bracteæ externæ latissime triangulares, suborbiculares, infra aurantiaceæ, supra hyalinæ costa excurrente breviter rufo-cuspidatæ; internæ minores, mucronatæ. Bract. perich. foliis caulinis similes ; seta 2–2·5 cm. longa, intense rubra ; theca fusco-viridis, subsymmetrica, elliptico-cylindrica lævis nec angulosa, collo distincto tumidiusculo (ætate obscuro), sub ore valde constricta, per totam superficiem *papillis acutiusculis* obtecta. Calyptra totam thecam obtegens, superne straminea infra pallida.

Hab. Near Ghoom, Himalayas, alt. 7000 ft., 1910, leg. Miss Craig (No. 9), c. fr. ; Darjeeling, 1911, leg. Mrs. Roper (No. 59), c. fr.

Belonging to the section *Anasmogonium*, and nearest to *P. rufisetum* and *P. infuscatum* Mitt., but differing from these and from all others of the section in the subpapillose, flattened and emarginate terminal cells of the lamellæ. The solid nerve and dense elevated lamellæ give the leaves a rigid texture, so that in the dry state they are less contorted and also less convolute than in most of the allied species. *P. rufisetum* Mitt. has much less developed lamellæ and a narrower nerve. The capsule and calyptra are described from the Darjeeling plant, which is in better condition as regards the fruit, but agrees with the Ghoom plant entirely in all its characters. The dorsal teeth of the nerve are pluricellular and sublamellose.

P. SEMINUDUM (Wils.) Mitt. Darjeeling, 1896, leg. Mrs. Sims (No. 53), st., det. Mitt. This was mixed with a fruiting plant referred by Mitten doubtfully to *P. fuscatum* Mitt.

P. PERICHÆTIALE (Mont.) Jaeg. Attapadi Hills, Coimbatore, alt. 5500 ped., Oct. 1910, leg. Fischer (No. 5), c. fr.

P. MICROSTOMUM (R. Br.) Brid. Walls and stones, alt. 7000 ped., Kundali, Nilgiri District, leg. Fischer (Nos. 17, 70), c. fr. Ghoom, Himalayas, leg. Miss Craig, 1910 (No. 8), st. Binsar, Almora, 1910, leg. Miss Shepheard (No. 5), st. Near Galle, Ceylon, 1898, leg. J. H. Darrell (No. 132), st.

Forsstroemia inclusa Card. & Dixon, sp. nov. (Tab. 517, fig. 2.) Inflorescentia dioica videtur, fl. masc. non visi. *F. trichomitrion* (Hedw.) Lindb. var. *immersæ* Sull. peraffinis; differt foliis sæpius angustioribus pro more longioribus, *nervo unico pertenui distincto ad medium folium attingente*, theca *breviter late ovata*, in perichætio *omnino inclusa*; seta *perbrevi*, vix dimidiam longitudinem vaginulæ æquante. Sporogonium totum (vaginula et operculo inclusis) vix 3 mm. longum. Vaginula breviter *parce pilosa*. Exothecii cellulæ elongate subrectangulares, laxæ, parietibus tenuibus, pallide lutescentes, apud orificium subito in seriebus pluribus (circa 8) multo minores, subquadratæ, fuscæ vel aurantiacæ. Peristomii dentes lutei, sublæves, vix papillosi. Calyptra *breviter parce* pilosa, pilis haud summam calyptram superantibus. Sporæ *magnæ*, 25–32 μ.

Hab. Naga Hills, Assam; found in stuffing of mammal-skin in British Museum, and sent by Mr. W. R. Sherrin (No. 4).

In habit and general structure scarcely differing from the North American *F. trichomitrion* var. *immersa*, but the entirely immersed capsule of different form, the well developed though slender nerve, larger spores, &c., are quite distinct. *F. cryphæoides* Card., from Japan, differs in the habit and narrower capsule.

PTEROBRYOPSIS WALKERI Broth. Trees, Mahableshwar, Western Ghats, Jan. 1909, leg. Sedgwick (No. 25), st. (*cf.* Journ. Bot. 1910, p. 298).

P. MAXWELLII Card. & Dixon. Trees in damp hollow, alt. 4–5000 ft., Mahableshwar, Western Ghats, Feb. 1909, leg. Sedgwick (No. 46), st.

P. FOULKESIANA (Mitt.) Fleisch. Naga Hills, Assam. From the skin of a flying squirrel in the British Museum, comm. W. R. Sherrin (No. 2), st. The gathering shows all gradations between the softer, more regularly pinnate form, characteristic of the plant as described by Mitten, and the rigid, yellowish form, *Garovaglia juliramea* C. M. in herb. Levier, referred to by Ren. & Card., *Musci Exotici*, p. 227; thus confirming the conclusion of Fleischer, who has reduced *G. juliramea* to a synonymn of this species. The Assam plant exhibits numerous small brown, articulate sausage-shaped gemmæ in the leaf axils along the main stem.

P. FRONDOSA (Mitt.) Fleisch. On tree-trunks in sholas,* Kundala, Nilgiri Hills, Feb. 1911; leg. Fischer (Nos. 16, 21), c. fr. Examination of numerous sporogonia in these specimens and in plants in the British Museum, *e. g.*, No. 826, Hb. Ind. Or. Hook. & Thomson, Ceylon, leg. Gardner, one of the specimens cited by Mitten, show that his description (Musc. Ind. Or. p. 86) of the seta is slightly incorrect, *viz.*, "pedunculum (cujus dimidium e perichætio exsertum)"; I find it rarely, if ever, to occur that as much as half is exserted; the perichætial bracts usually extend much beyond the middle of the seta, and occasionally almost to the base of the capsule.

I have in my herbarium a plant distributed by the late T. W. Naylor Beckett as "*Met. frondosum* Mitt., on trees, 5000 ft., Maturata, Ceylon, Sept. 1883," as to the correctness of which I feel considerable doubt; the stem is long, flexuose, with irregular and short pinnate branches, considerably different from the rigidly closely pinnate branching of *P. frondosa*, and the alar cells are very little differentiated. In *P. frondosa* they are numerous, orange-brown, and clearly defined, forming well-marked decurrent auricles ("obscurius" in Mitten's description must be taken of the contents of the cells, not of their presence).

P. HOOKERI (Mitt.) Card. & Dixon. Darjeeling, Miss L. J. Robinson (No. 33), st. Good fruiting specimens of this were issued by Miss Roberts in her sets of Himalayan Mosses, No. 92.

PAPILLARIA FUSCESCENS (Hook.) Jaeg. A common moss in the neighbourhood of Darjeeling. A plant sent by Miss L. J. Robinson in 1896 (No. 9) has thick branches, and I should refer it to var. *crassiramea* Ren. & Card., to which also would probably belong a striking form issued by Miss Roberts in the Himalayan Mosses, No. 27, determined by Brotherus as *forma ramis crassis*.

A further Darjeeling plant, leg. Mrs. Sims, 1896 (No. 41), c. fr., of a bright green colour, has leaves not much contracted when dry, but convolute, and spirally arranged on the branches, sometimes in a very marked manner. This was sent to Mitten, who labelled it "*Trachypus funiformis* C. Muell. Wilson considered this to be a large state of *Meteorium fuscescens*." He wrote further about it: "No. 4 is *M. fuscescens*, in which the capsule is immersed in the perichætium; it is very variable in stature, rare in fruit, and I am unable to distinguish your 41 from it; this too was Wilson's opinion." This No. 41 is identical with a plant collected by Mrs. Bamforth in Ceylon, and sent me by Rev. C. H. Binstead as *P. Bamforthiæ* Broth. MS. In spite of the colour and habit, this is very close to *P. fuscescens* in structure, and at first scarcely separable; there is however a character which appears to be constant and of some value. In *P. fuscescens*, as pointed out first, I believe, by Fleischer, the papillæ are not on the cell lumen, but on the longitudinal walls dividing the cells, a character which separates it from all the Indian species, at least, of the genus. The position of the papillæ is not always very easy to ascertain in the upper part of the leaf owing to the density of the areolation, but it is easily made out in connection with the wider and more pellucid cells towards the basal auricles. In *P. Bamforthiæ* Broth. I have sometimes found the papillæ on the upper cell walls, but for the most part they are on the face, and on the basal part of the leaf they are seen very distinctly to be on the lumen. *P. Bamforthiæ* is therefore in all probability a good species, contrary to the opinion of Wilson and Mitten.

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* Sholas = wooded ravines.

P. SEMITORTA (C. M.) Jaeg. is another abundant moss at Darjeeling; I have received numerous specimens from there, two or three of them, leg. Mrs. Roper (Nos. 13, 16) and Miss Craig (No. 3), I refer to f. *subsemitorta* Fleisch. (*P. subsemitorta* C. M. in sched.); they are more robust than the type, blackish within and often golden above, with somewhat shorter, wider leaves.

METEORIUM BUCHANANI (Brid.) Fleisch. I have received from several stations in the north of India, ranging from Almora to Assam. One specimen, leg. Miss E. Shepheard (No. 3), has a few capsules. This is also the case with a specimen in the British Museum (No. 490, Herb. Griffith in Herb. East India Co., Bhotan); the fruit of this species has not, I believe, been described. The sporophyte is very similar to that of *M. Miquelianum* (C. M.), but the seta is practically smooth, scarcely at all roughened, the capsule slightly smaller and more turgidly oval, the exothecium cells somewhat larger and laxer, and especially the peristome teeth are much less papillose; in fact, the papillæ are nearly absent, so that the peristome is pellucid, and the transverse striæ at base almost wanting.

M. ATRATUM (Mitt.) Broth. (*Trachypus atratus* Mitt.). This plant has given rise to much misunderstanding. Fleischer (Musci . . . von Buitenzorg, iii. 778) makes it a synonym of *M. punctulatum* (C. M.) Mitt. But C. Müller's plant is an *Aërobryidium*, with gradually pointed, transversely undulate leaves, and Mitten's description of *Trachypus atratus* by no means agrees with this, as he compares it with *M. Buchanani*, a totally different plant; moreover, his description of the leaves (cymbiformi-concavis oblongo-obtusis subito in cuspidem tenuem elongatam productis, cellulis lævibus, &c.), does not at all apply to *M. punctulatum.*

I have received several plants from Ceylon, gathered by Naylor Beckett, and named *M. atratum* (Mitt.), which agree in nearly every detail with Mitten's description, except that the leaves are longitudinally plicate, as to which Mitten says nothing. It became obvious on comparison that these belonged to *M. Miquelianum* (C. M.) forma *atrata* Fleisch., but whether or not they were really Mitten's plant was another matter. In order to solve the difficulty, if possible, I applied to Mrs. Britton, who kindly sent me portions of several plants from Mitten's herbarium of his *T. atratus*, including some cited by him in his original description.

Some of these are absolutely identical with Beckett's plants, and nearly all have the deeply longitudinally plicate leaves (characteristic of *M. Miquelianum*), especially when dry. One or two, it is true, have a different appearance, having the stem- and lower branch-leaves black and the upper branches orange, attenuated at the tips, more distant, and with the leaves not plicate; but these are indisputably connected with the other form by plants bearing both forms of leaves on the same stem. Moreover, a part of one specimen, coll. Griffith, which Mrs. Britton has marked "The type is like this," has the orange colouring of the above form with the leaves deeply and regularly plicate.

There can be no doubt that Mitten's *T. atratus* is identical with *M. Miquelianum* f. *atrata* Fleisch. Like other forms of that species it varies very much in habit and colour, and it is probably an extreme form which has led Fleischer to identify it with *M. punctulatum* (C. M.).

Fleischer has already pointed out that *Neckera plicæfolia* C. M. (Nilgiris, leg. Schmidt) is the same thing as *M. Miquelianum*. Specimens of this in the British Museum from C. Müller's herbarium are absolutely identical with Foulkes' Ootacamund specimens of *T. atratus* (marked "co-type" by Mrs. Britton).

The sporogonium, it may be added, of *T. atratus* quite agrees with that of *M. Miquelianum*.

AËROBRYIDIUM PUNCTULATUM (C. M.) (*Pilotrichum punctulatum* C. M.); Darjeeling, 1895, leg. Miss Robinson (No. 10), st. I have compared this with specimens (Ceylon, leg. Nietner, ex herb. C. Müller) in the British Museum, and it certainly belongs here. An identical plant was sent me by Mons. Cardot from Kodikanal, Madura, leg. André, 1908. They appear to belong to *Aërobryidium* rather than to *Meteorium*, near to *A. filamentosum* (Hook.), and doubtfully separable from *A. auronitens* (Hook.).

FLORIBUNDARIA AUREA (Griff.) Broth. Darjeeling, leg. Miss Robinson (Nos. 7, 37), st.

F. PHÆA (Mitt.) Broth. Darjeeling, 1911, leg. Mrs. Roper (No. [illegible]), st.; and 1895, leg. Miss Robinson (No. 25), st.

BARBELLA STEVENSII (Ren. & Card.) Fleisch. Darjeeling, 1911, leg. Mrs. Roper (No. 16), st.; and 1896, leg. Mrs. Sims (No. 42), c. fr.

B. RUFIFOLIA (Thw. & Mitt.) Broth. Nuwara-Eliya, Ceylon, 1898, leg. J. H. Darrell (No. 139), st.

B. AMŒNA (Thw. & Mitt.) Fleisch. Nuwara-Eliya, Ceylon, 1898, leg. J. H. Darrell (No. 138), st. In comparing Mr. Darrell's plant with Thw. & Mitten's *M. amœnum* in the British Museum in 1898, I ascertained that the species was at that time undescribed, although distributed by Thwaites in the Ceylon Mosses under No. 206. I wrote to Mitten on this point and quote his reply, as it is of some interest: "I have looked over my *M. amœnum* and I find I have written in the name on the sheet containing it, so that I must have considered it done with when the Ceylon mosses sent out by Thwaites were published, for I marked it '*M. amœnum*

T. & M.,' but on looking at the paper, a copy of which I send, I see it is not included; how this came about I do not know."

Fleischer has published a description of the species in the Musci . . . von Buitenzorg, iii. 802.

B. COMPRESSIRAMEA (Ren. & Card.) Fleisch. Sikkim (from a squirrel skin in the Brit. Mus., comm. W. R. Sherrin) (No. 1), st.

B. SPICULATA (Mitt.) Broth. Sikkim, with the last species (No. 2), c. fr. The lid, which I believe has not been described, gradually tapers from a high conical base to a sharp oblique beak, about two-thirds the length of the capsule. The leaves in this specimen have the cells remotely but sharply papillose, as they are also in a specimen "No. 12, E. Levier, Bryoth. exotica, Kurseong, leg. Decoly." This character, I find, varies considerably in different parts of the same plant, and the leaves may be almost smooth, as described by Mitten.

B. BOMBYCINA (Ren. & Card.) Fleisch. Sikkim, 8000 ft., leg. H. H. Mann, comm. G. Webster (No. 338), st. Det. Paris.

METEORIOPSIS RECLINATA (Mitt.) Fleisch. Naga Hills, Assam (from the skin of a flying squirrel in the British Museum, comm. W. R. Sherrin) (No. 3), st.

DIAPHANODON BLANDUS (Harv.) Ren. & Card. Darjeeling, 1911, leg. Mrs. Roper (No. 3), st.

D. THUIDIOIDES Ren. & Card. Binsar, Almora, 1910, leg. Miss E. Shepheard (Nos. 6, 8), c. fr.; (No. 23), st.; det. Cardot. Near Almora, 1905, leg. Miss L. J. Robinson (No. 63), st.

D. BROTHERI Ren. & Card. Darjeeling, 1911, leg. Mrs. Roper (No. 23), st.

D. PROCUMBENS (C. M.) Ren. & Card. Trees and stems, Mahableshwar, Western Ghats, 4–4500 ft. alt., Jan. 1909, leg. Sedgwick (No. 28), c. fr.

The plant recorded (Journ. Bot. 1909, p. 164) as *Trachypodopsis blanda*, from Trimbak, properly belongs here also. It was determined as *T. blanda* by Fleischer, but this was probably a *lapsus calami* for *procumbens*, as it certainly belongs to this species.*

TRACHYPODOPSIS AURICULATA (Mitt.) Fleisch. Darjeeling, 1911, leg. Mrs. Roper (Nos. 24, 25, 27), st. Near Ghoom, Himalayas, 1911, leg. Miss Craig (No. 2), st.

CRYPTOLEPTODON FLEXUOSUS (Harv.) Ren. & Card. Binsar, Almora, 1910, leg. Miss Shepheard (No. 9), c. fr.

NECKEROPSIS (*Paraphysanthus*) ANDAMANA (C. M.) Fleisch. Near Karwar, North Kanara, Western Ghats, June, 1909, leg. R. M. Maxwell, comm. Sedgwick (No. 70), c. fr. Specimens from the Andaman Islands in the British Museum have been compared. It has hitherto, I believe, been recorded only from that group.

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* The district referred to in the above-cited paper as 'Nasile' should, I learn, be corrected to 'Nasik.'

HOMALIODENDRON MONTAGNEANUM (C. M.) Fleisch. Sikkim, comm. W. R. Sherrin (No. 4), st. Det. Cardot.

H. LIGULÆFOLIUM (Mitt.) Fleisch. Nuwara-Eliya, Ceylon, March, 1898, leg. J. H. Darrell (No. 147), st. Det. Fleischer. I am very loath to import any fresh difficulties into the problems of this very troublesome genus, more especially as I cannot suggest any solution of the point at issue; but I feel compelled to refer to Mitten's opinion on the matter of *H. ligulæfolium.* Fleischer, it may be recollected (Hedwigia, xlv. 97, and Musci . . . von Buitenzorg, iii. 911), has separated the *Homalia ligulæfolia* of the *Bry. javanica* from that of Mitten, and described it as a new species, *Homaliodendron squarrulosum* Fleisch. In the latter publication he has a note on *H. ligulæfolium* (Mitt.), comparing it with *H. scalpellifolium,* and adding, "ferner sind die Stengelblätter deutlich querwellig." This undulation of the stem-leaves is marked in No. 191, Max Fleisch. Musc. Fr. Arch. Ind., Ser. iv., *H. ligulæfolium* (Mitt.) Fleisch. from Ceylon, and also in Darrell's Ceylon plant, determined by Fleischer. But Mitten, to whom I sent a specimen of Darrell's plant (as *N. ligulæfolia* Mitt.), wrote of it: "I do not see any undulation, as in yours, in any of my Ceylon or Indian specimens. I send you a stem of what I have marked as the original of *N. ligulæfolia,* as to outline; no two stems are alike, and I think the form of the leaves on the attenuated ramuli varies as they are more or less prolonged; all this set are difficult to discriminate . . . now I should place all these Indian species in *Porotrichum.* . . . I have looked at the small specimen I have of Thwaites's collecting and I see no undulation, otherways I should think your moss to be a state of *P. ligulæfolium.*"

The specimen (leg. Gardner) sent by Mitten as the original of his species certainly shows no trace of undulation in the stem-leaves. As Mitten himself was unable to detect any differences between the two Ceylon plants, beyond the undulation, it may be that they should be looked upon as two forms of the same species; but in any case the facts above stated must be held to modify the description of *H. ligulæfolium* given by Fleischer. Apart from the undulation of the leaves, there are other differences of more or less value, though certainly not great, between the Javanese plant and the Ceylon forms, and I do not venture to suggest that Fleischer is wrong in keeping them specifically distinct, at any rate, while so many species are retained in this group differing from one another by perhaps even less important characters.

Pinnatella calcutensis (C. M.) Fleisch. In large masses, pendulous from branches of trees, Mahableshwar, Western Ghats, alt. 4–5000 ped., Jan., 1909, leg. Sedgwick (No. 26), c. fr. A fine plant, the fruit of which has not been found before. Its stems reach to 8 or 9 in. in length, with mostly simple, distant, irregular branches, which are more or less curled when dry. I have compared it with a part of the type specimen determined by C. Müller (kindly sent to me by the late Dr. E. Levier) as "*Urocladium calcutense*" (I have adhered to the original spelling of the specific name). The fruit may be described as follows (Tab. 517, fig. 4):—Perichætia from the middle of the secondary stems and branches, about 2 mm. long, bracts faintly nerved, from a subsheathing base abruptly narrowed to a short, wide, rigid, sub-ligulate denticulate point, which is patulous in the outer, suberect in the inner bracts; areolation elongate, smooth, chlorophyllose, often with a single marginal row of narrow, retangular, colourless cells. Vaginula large, hairy. Seta, 2–3 mm., straight or slightly curved, yellowish, somewhat thickened and very slightly roughened above. Capsule turgidly oval, with a short neck, orange-brown, pachydermous, somewhat glossy, exothecium cells large, firm-walled, irregular. Calyptra and lid unseen. Outer peristome (fragmentary), yellow, teeth united at base, papillose below, smooth above; median line zigzag, sometimes perforated above. Endostome (very fragmentary), a low yellowish, smooth basal membrane with short (probably broken), subulate erect processes. Spores about 25 μ, greenish.

SYMPHYODON ANGUSTUS (C. M.) Broth. Trees, alt. 4000–4500 ft., Mahableshwar, Western Ghats, Jan. 1909, leg. Sedgwick (No. 27), c. fr. I have compared this with an original specimen from Bombay in herb. Bescherelle, from C. Müller, and find that it agrees exactly. C. Müller's description of the capsule as "minuta, elliptica" seems quite inappropriate to his own specimen; the capsules measure 3 mm. without and 3·5 mm. with the lid. The lid and upper third of the capsule are usually smooth.

S. ASPER (Mitt.) Jaeg. Sikkim, comm. W. R. Sherrin (No. 5), c. fr.

? ENTODON CALIGINOSUS (Mitt.) Jaeg. Darjeeling, 1911, leg. Mrs. Roper (No. 9), st. A sterile plant, which I should have referred without hesitation to *E. orthocarpus* (La Pyl.), were it not that *E. caliginosus* (Mitt.), according to specimens ex herb. Mitt. (No. 536, Bhotan, Griffith), in spite of the differences in cell-structure described by Mitten, appears to be absolutely identical with the European plant in vegetative characters; the alar cells, especially, seem in no way different. Griffith's plant, however, is in fruit, and the capsules are distinctly shorter and wider than the few I have seen of *E. orthocarpus*, and I hesitate therefore to refer the Bhotan plant there. I have not seen Mitten's type, which he describes from sterile specimens (he does not appear at that time to have seen Griffith's plant), and the question must therefore be left in abeyance; but it appears to need further investigation.

E. PROREPENS (Mitt.) Jaeg. Naga Hills, Assam (in skin of flying squirrel from the British Museum), comm. W. R. Sherrin (No. 14), c. fr.

E. THOMSONI (Mitt.) Jaeg. Binsar, Almora, 1910, leg. Miss Shepheard (No. 10), c. fr. Banks and stones, alt. 4000 ft., Fort Purandhar, Western Ghats, 1910, leg. Sedgwick (Nos. 135, 136), st.; (No. 105), c. fr., a robust, very glossy form with stout branches, julaceous and curved when dry.

E. PLICATUS C. M. Attapadi Hills, Coimbatore, 1910 (No. 12), and Bolampatti Hills, 2500 ft. alt., 1911 (Nos. 25, 56), c. fr.; all leg. Fischer. On trees, Lonavla, Western Ghats, 1903, leg. G. A. Gammie, comm. Sedgwick (No. 101), c. fr. The leaves in this species vary much, from almost entire to closely and finely serrulate, even in different leaves on the same stem.

Bryosedgwickia, Card. & Dixon, gen. nov. Entodontacearum.

Habitus, folia, theca, &c. Pylaisiæ. Peristomium internum ab externo *liberum*; membrana basilaris *alta*, *pergranulosa*; processus *filiformes*, *nodosi*, *papillosi*, *haud perforati*, dentibus externis subæquilongi. Perist. externum Pylaisiæ.

It may possibly be a question whether some of the genera of this Order, allied to *Pylaisia*, and differing *inter se* but little in vegetative characters, are not founded on somewhat minute differences of peristome; but accepting such a classification as, *e.g.*, that of Brotherus (in Engler & Prantl, *Pflanzenfamilien*), the plant on which we have founded this genus certainly stands clearly apart, and to unite it with any of the existing genera could only be consistently done by a total reconstitution of the Order, and by "lumping" together a number of well recognized generic groups. *Platygyrium*, for example, and *Platygyriella* Card., a new Mexican genus, scarcely differ from *Pylaisia* except in the absence of a basal membrane, and *Giraldiella* C. M. in little but the estriate outer teeth; and the character of the endostome in our genus is distinctly of more importance than such differences as these. *Pylaisia nana* Mitt., from Japan has, as Mons. Cardot informs me, a granulose basal membrane, but the processes are broad and of the normal *Pylaisia* type. The new genus will therefore probably be considered by most bryologists as a very well founded one. We have named it after the collector, Mr. Sedgwick, from whom I have received many interesting Indian mosses.

Bryosedgwickia Kirtikarii Card. & Dixon, sp. nov. (Tab. 517, fig. 3.) Dense cæspitosa, mollis, nitida, *sericea*, pallide lutescens; caules dense intertexti, ramosi, ramis circa 2 cm. longis, tenellis flexuosis, ramulis paucis tenerrimis, *sæpe curvatis, siccis subjulaceis*. Folia sat conferta, imbricata, humida patula, sicca erecta subjulacea, caulina late ovata, breviter acute acuminata, sæpe parte superiore decolorata, ramea brevius latius acuminata vel acuta, marginibus planis integris, brevissime obscure binervosa; cellulæ foliorum caulinorum *angustissime lineares* tenuissimæ, rameorum paullo breviores latiores, basilares in medio folio latiores, ad angulos *in seriebus circa quinque subquadratæ, magnæ, bene definitæ, chlorophyllosæ.* Autoica; flores masc. minuti, in foliorum rameorum axillis siti, bracteis breviter ovatis subobtusis. Perichætium breve, bracteis suberectis, sensim acutis, apice subdenticulato. Seta tenuis, rubra, erecta, circa 2 cm. alta; theca erecta, æqualis vel leniter curvata, anguste elliptica, sicca subcylindrica, rufa, circa 2 mm. longa, operculum elongate conicum vel breviter oblique rostellatum, obtusiusculum. Exothecii cellulæ irregulariter ovali-hexagonæ, sat magnæ incrassatæ, apud

orificium breviora minora subquadrata. Stomata sparsa, male evoluta. Annulus nullus. Peristomium prope orificium insertum, dentes externi lanceolati, ·3–·35 mm. longi, lutei, lamina dorsalis sat dense trabeculata, linea media angulata, superficie usque ad mediam partem fortiter transverse striolata, parte superiore grossiuscule irregulariter papillosa, subpellucida; lamellis externis paucis obscuris. Endostomii membrana circa 1 mm. alta, saturate lutea, e scutellis bene delimitatis fortiter granulosis instructa, processus lutei. (Cetera generis.) Sporæ 15–25 μ.

Hab. On tree, Fort Purandhar, Poona District, May, 1910 (No. 92), c. fr.; and on stem of *Euphorbia* (No. 85), c. fr.; on trees, alt. 4000 ft., Panchgani, Western Ghats (No. 55), st.; on tree, Mahableshwar, Western Ghats, Jan. 1909 (No. 22), c. fr.; all leg. Sedgwick.

In appearance and general characters almost exactly identical with *Pylaisia aurea* (Hook.) Broth., and only to be distinguished by the very different structure of the peristome and the smaller spores. In *P. aurea* the inner peristome is adherent to the outer, and consists of a pale, not granulose, basal membrane, with very short processes of the normal *Pylaisia* form.

We have named this species after Lieut.-Col. K. R. Kirtikar, I.M.S., whose contributions to the botany of South India are numerous and valuable, and who has collected a number of interesting mosses from the Poona and Bombay districts.

Lindbergia longinervis Card. & Dixon, sp. nov. (Tab. 517, fig. 5.) Habitus *L. Austinii* (Sull.) Broth., sed paullo gracilior, sordide fuscescens ad ramos arborum inter muscos repens. Folia caulina e basi subsquarrosa patentia vel assurgentia, sæpe subsecunda, sicca vix mutata, vix 1 mm. longa, ad basin breviter angustissime decurrentia, *anguste ovata, sensim in acumen longum tenue angustata*, margine plano, ad infimam basin tantum aliquando angustissime recurvo, superne minute denticulato. Costa sat valida, lutea, in foliis inferioribus nonnunquam *usque ad medium acumen producta, sæpius versus* $\frac{2}{3}$ *folii longitudinem soluta.* Folia ramulina minora, paullo brevius acuminata, sicca subappressa, erecta. Areolatio subpellucida, cellulæ rhomboideo-hexagonæ, 8–12 μ longæ, 5–6 μ latæ, ad utramque paginam *papillam unicam mediam altam acutam* gerentes; alares numerosæ, transverse ovales, superiores elongatæ, in acumine rhomboideo-lineares. Autoicum. Perichætium parvum, bractæ erectæ, breviter acuminatæ, pellucidæ, e cellulis subrectangularibus lævibus instructæ. Seta rubra *perbrevis*, ·5–·75 cm. longa; theca minuta, anguste ovalis, circa 2 mm. longa, pachydermica, rufo-fusca, operculo convexo. Exothecii rete valde densum, parietibus longitudinalibus fortiter incrassatis, transversalibus contra tenuibus. Peristomium generis; dentes albidissimi, *lati* (ad basin 70–80 μ), *subacuti, latissime marginati*, papillosi, *extus altiuscule trabeculati.* Sporæ aurantiacæ, minutissime granulosæ, circa 15 μ.

Hab. On trees, Binsar, Almora, 7000 ft. alt., 1910; leg. Miss E. Shepheard (No. 11).

A very distinct plant, differing from all the other Indian

species of the genus in the papillose leaves; from *L. Austinii* (Sull.) in the narrower, more finely acuminate leaves with more acutely papillose cells, short seta, and different structure of the peristome teeth. *Leskea abbreviata* Schp. from Abyssinia, while extremely close in habit and fruiting characters, has the wider, less gradually and longly tapering leaves of *L. Austinii*, and the cells very shortly, often quite obscurely, papillose.

Explanation of Plate 517.

Fig. 1. *Pogonatum papillosulum.* *a*, leaf, × 10. *b*, back of nerve, × 100. *c*, lamellæ in section, × 200.

Fig. 2. *Forsstroemia inclusa.* *a*. leaf, × 20. *b*, perichætium, partially opened, × 12. *c*, calyptra, × 20.

Fig. 3. *Bryosedgwickia Kirtikarii.* *a*, stem, nat. size. *b*, stem leaf, × 20. *c*, branch leaf, × 20. *d*, apex of stem leaf, × 50. *e*, apex of branch leaf, × 50. *f*, peristome, × 100.

Fig. 4. *Pinnatella calcutensis.* *a*, part of fruiting stem, nat. size.

Fig. 5. *Lindbergia longinervis.* *a*, plant, nat. size. *b*, leaf, × 20. *c*, upper cells, × 200. *d*, basal marginal cells, × 200. *e*, peristome, × 100 (from left to right, profile, dorsal, and ventral view). *f*, peristome tooth, dorsal view, × 200. *g*, papillæ at back of leaf, × 200.

A REVISION OF THE GENUS *BERTIERA*.

By H. F. Wernham, B.Sc.

(Continued from p. 117.)

DIVARICATÆ, sect. nov. Inflorescentia ramorum subæquantium dichotomorum divaricatorum composita.

1. B. Dewevrei de Wild. in Ann. Mus. Congo, iii. i. 113 (1901).

Hab. Congo, near Stanleyville: *Dewèvre*, 11676.

A somewhat isolated species, comparable, according to the authors, only with *B. breviflora*; we have associated the two on the ground of the inflorescence character. According to the description this species is distinctive in the large size of the stipules and the truncate glabrous calyx, with limb entire.

2. B. breviflora Hiern, in Oliver. Fl. Trop. Afr. iii. 85 (1877).

Hab. Eppah: *Barter*, 3292! Gaboon River: *Mann*, 923! Batanga: *Bates*, 180! 305! Sierra Leone: *Scott Elliot*, 4646! 4939! Oban, S. Nigeria: *Talbot*, 209! Ashanti: *Cummins*, 124! Lagos: *Rowland*! Kamerun: *Preuss*, 324! 1132! *Rudatis*, 91! Hbb. Mus. Brit. and Kew.

LAXÆ, sect. nov. Inflorescentia rachide mediana plus minus bene distincta ramis lateralibus cymorum laxiusculorum compositis.

3. B. laxissima K. Sch. in Engl. Bot. Jahrb. xxxiii. 348 (1904).

Hab. Kamerun: *Zenker*, 1425! Hbb. Mus. Brit. and Kew.

The floral pedicels, in many cases measuring over 2 mm., are noticeable in this species, as well as the rather ill-defined, sinuous main rachis of the inflorescence. (See fig. 2 and introduction, *supra*).

4. **B. Batesii,** sp. nov. Inflorescentia laxa thyrsoidea rachide

mediana leviter undulata floribus inter minores sessilibus corolla extus glabra stipulis magnis.

Hab. Batanga, West Africa: *Bates*, 222! Hbb. Mus. Brit. and Kew.

Verisimiliter frutex, ramulis gracilibus appresse cinereo-pubescentibus, foliis ellipticis utrinque æqualiter breviter angustatis 8–15 cm. × 2·5–5·5 cm. apice acuto margine ciliata superne glabris nisi super venam mediam strigoso-pilosis subtus similiter passim præcipue super venas sparse indutis petiolo ad 8 mm. longo, stipulis lanceolatis ad 2·5 cm. × 8 mm. caudato-acuminatis intus glaberrimis extus ramulorum modo pilosis, inflorescentia perlaxa pedicello 6–10 cm. rachide mediana leniter undulata ramulis lateralibus 6-10-floris bracteis lineari-subulatis ca. 5 mm. longis bracteolis obsoletis alabastris valde acuminatis calyce toto vix 2 mm. longo pubescente limbo minutissime dentato, corollæ tubo 7–8 mm. longo externe a basi longitudine ca. 5 mm. glaberrimo superne pubescente limbi laciniis basi latiusculis insuper setaceis vix 2 mm. longis glabratis faucibus villosis stylo filiforme sub stigmate bilobato complanato, bacca subglabra 10-costata, seminibus tetrahedris.

5. B. LAXA Benth. in Hook. Nig. Flor. 394 (1849).

Hab. Niger: *Vogel*, 148! Fernando Po: *Mann*, 200! Oban: *Talbot*, 51! Kamerun: *Staudt*, 549! 4090! 4272! *Preuss*, 1367!—a broad-leaved form; *Bates*, 390! a form with small stipules and short, rather dense inflorescences, the latter probably due to immaturity. Hbb. Mus. Brit. and Kew.

The mature flowers, as seen in Talbot's plant, are among the largest in the genus, measuring from 2 cm. to 2·5 cm. in length.

6. **B. pedicellata,** sp. nov. *B. laxa* Benth. var. ? *pedicellata* Hiern in Oliv. Fl. Trop. Afr. iii. 85.

Inflorescentia longa thyrsoidea laxissima floribus pro genere longissime pedicellatis.

Hab. St. Thomas Is., West Africa: *Mann*, 1068! Hb. Kew.

Frutex ramulis sparse pubescentibus foliis angustis oblongis ca. 12 cm. × 3 cm. utrinque angustatis glabris nisi super venas appresse pilosis petiolis ad 1 cm. longis, stipulis glabris lanceolatis 1 cm. longis acuminatis vix vaginantibus inflorescentia laxissima cymis lateralibus paucifloris bracteis bracteolisque minutis florum pedicellis fere ad 1 cm. longis 2–3-bracteolatis, calyce campanulato sparse pubescente limbo apparente dentibus subulatis, corollæ tubo basi intus villoso extus pubescente antheribus linearibus basi alte bifidis ca. 4 mm. longis seta 1 mm. longa apiculatis, stylo filamento stigmate lineari striata, bacca. . . . .

The difference from *B. laxa* seems to be more than varietal. Apart from the shape of the leaves and the presence of conspicuous floral pedicels, the stipules are much smaller and the calyx-limb well-pronounced.

7. B. GONZALEOIDES Wright ex Griseb. Cat. Pl. Cub. 124 (1866).

Hab. Cuba: *Wright*, 2668! Hbb. Mus. Brit. and Kew.

The species is described as glabrous, and the example named

is entirely so; in this character it differs from most of its allies, although glabrous examples of *B. guianensis* (q. v.) occur. The critical characters of this Cuban species appear to be the obtuse apex of the narrow leaf, which is lengthily acuminate at both ends, the short corolla-tube, and the comparatively short and broad anthers, which have but a small apical continuation of the connective.

8. B. PARVIFLORA Spruce ex K. Sch. in Mart. Fl. Bras. VI. 325 (1889).

Hab. Brazil, near San Gabriel do Cachoeiros, Rio Negro: *Spruce*, 2774! São Paulo, *Trail*, 392! Hbb. Mus. Brit., Kew, and Univ. Cambridge.

At once recognizable by the small size and large number of the flowers, arranged in a lax thyrsus. The leaves in the available material, too, are conspicuously large—22 cm. × 8 cm.

9. B. PROCUMBENS K. Sch. et K. Krause in Engl. Bot. Jahrb. xl. 328 (1908).

Hab. Ecuador, near Bulao, in woods: *Eggers*, 14282. Columbia, loamy banks in woods of St. Francis, Esmeraldas: *Barclay*, 738! Hb. Mus. Brit.

I have, unfortunately, not seen the type-plant, but from the description I have little doubt in assigning Barclay's plant to the same species. The stipules, sheathing for the greater part of their length, and produced each into a long seta, which is decurrent as a line of hairs down the middle face of the sheath, are very characteristic. The general habit recalls *B. angustifolia.*

10. B. PALUSTRIS A. Rich. in Mem. Soc. Hist. Nat. Paris, v. 254 (1829).

Hab. Guiana, in forest marshes: *Richard.* Differs from *B. guianensis*, according to the description, in having bifid stipules and closely approximated lateral leaf-veins, and in its almost herbaceous habit. I have not seen a specimen.

11. B. ANGUSTIFOLIA Benth. Bot. Sulph. 103 (1844).

Hab. Cocos Island: *Hinds*! *Barclay*, 2184! Hbb. Mus. Brit. and Kew.

Its affinities are with *B. guianensis*, but its narrow leaves and small berries are characteristic. The seeds, too, are less deeply foveolate than in *B. guianensis.*

12. B. GUIANENSIS Aubl. Pl. Guian. i. 180, t. 69 (1775); Poiret, Supp. Encyc. Méth. i. 625; Lam. Ill. t. 169, fig. 1; A. Rich. Mem. Soc. Hist. Nat. Par. v. 254, t. 23, fig. 1. *B. mucronata* Gaertn. f. Carpol. 75, t. 192. *B. leiantha* Spruce MS.

Hab. Guiana: *Aublet*! *Sagot*, 890! *Hostmann*, 1202! *de Vriese*! *von Rohr*! *Rudge*! *Martin*! *Schomburgk*, 82! *Poiteau*! Trinidad: *Fendler*, 451! *Purdie*, 11! Colombia: *Triana*, 1844! Venezuela: *Rusby*, 214! 285! *Fendler*, 2340! (a form with exceptionally large stipules). Brazil: *Spruce*, 1788! *Baker*, 113! *Spencer Moore*, 372! *Riedel*, 1298! *Burchell*, 9664! 9674-2! 9728! 9268! *Ule*, 5193! Peru: *Spruce*, 4109! a glabrous form. Bolivia: *Williams*, 405! Panama, dense woods, Lion Hill Station, *Hayes*, s. n.!—glabrous in part. Hbb. Mus. Brit., Kew, and Univ. Cambridge.

In nearly all the specimens seen the branchlets are covered with a relatively dense light-brown strigose indumentum; but the presence of this, unfortunately, does not appear to be a safe criterion—at least, not in the dried state—as the specimens from Peru and Panama are almost perfectly glabrous. Part of the latter, moreover, is glabrous and part clothed similarly to the typical *B. guianensis*, and both parts were gathered in all probability from the same plant. In these circumstances it becomes necessary to distinguish the present species from *B. gonzaleoides*; this has been attempted under the head of that species (*q. v.*).

It will be seen that *B. guianensis* is unrecorded from the West Indian area. There is one sheet in the Kew herbarium bearing a queried label:—"Jamaica, Dr. Dancer, Herb. Forsyth"; but this is apparently an error, and Mr. Fawcett, late Director of Public Gardens and Plantations, Jamaica, assures me that the genus *Bertiera* is not, so far as he knows, included in the flora of that island.

13. B. LONGITHYRSA Baker in Journ. Linn. Soc. xxv. 322 (1890).

Hab. Madagascar: *Baron*, next 5789! *Hildebrandt*, 3002! Hbb. Mus. Brit. and Kew; *Pervillé*, 759! probably should be assigned to this species.

Notable for its conspicuously long, subfoliaceous bracteoles.

14. B. FERA A. Rich. in Mem. Soc. Hist. Nat. Paris, v. 254 (1829). *B. rufa* DC. Prod. iv. 392; De Cordemoy, Fl. de la Réun. 504.

Hab. Ile de la Réunion: *de l'Isle*, 7676! *Balfour*! Hb. Kew.

The name *rufa* in the *Prodromus* appears to be the result of a clerical error, as the authority there cited is "A. Rich. in mem. soc. h. n. Par. v. 5, p. 254," from which de Candolle's description is, essentially, transcribed; and in Richard's memoir the name of the same species appears as *B. fera*. This error persists even in de Cordemoy's flora (*loc. cit.*).

The species is readily distinguishable by the dense ferruginous indumentum, which recalls that of *B. africana*, and by the relatively long (2 mm. or more) calyx-lobes, erect in the fruit.

15. B. BORBONICA A. Rich. in Mem. Soc. Hist. Nat. Paris, v. 254 (1829); DC. Prod. iv. 392.

Hab. La Réunion: *M. Richard*! *Carmichael*, 271! *de l'Isle*, 909! Hbb. Mus. Brit., Kew, and Univ. Cambridge. Mauritius: *Bouton*! Hb. Univ. Cambridge.

De Cordemoy (Fl. de la Réun. 504) regards this as identical with the Mauritian *B. Zaluzania*, but it appears, from the material available in the English herbaria, to be quite distinct, in the character of the erect fruiting calyx-lobes, and in its much more diffuse and widely branched inflorescence and smaller flowers very acuminate in the bud. The anthers, moreover, are linear in this species; in *B. Zaluzania* they are shorter and broader, almost ovate.

16. B. BISTIPULATA Boj. Ramulis foliisque glabratis, stipulis

oblongis glabris membranaceis inter maximis, inflorescentia thyrsoidea laxe paniculata rachide mediana distincta, bracteolis nec conspicuis.

Hab. Mauritius: *Hb. Blackburn*! *Bouton*! *Grey*! in Hb. Kew.

The stipules, attaining a length of 3 cm. and breadth of 1·5 cm., readily distinguish this species, as well as the spreading paniculate inflorescence and short ovate, mucronate buds.

17. B. ZALUZANIA Gaertn. f. Carpolog. (1805) 74, t. 192, fig. 7 (1805); Poir. Encyc. Méth. Supp. i. 625; Lam. Ill. t. 165, fig. 2. *Zaluzania* Commerson MS. et Ic. ined. *Mussænda racemosa* Boj.

Hab. Mauritius: *Commerson*! *Thompson*! *Carmichael*, 66! *Macgregor*! *Aublet*! *Roxburgh*! *Bojer*! *Hb. Blackburn*! *Bouton*! *Néraud*! *Ayres*! *Grey*! La Réunion, in Hb. Univ. Cambridge! collector unknown. Hbb. Mus. Brit., Kew, and Univ. Cambridge.

This species has been confused by some authors with *B. borbonica* (q. v.).

18. B. BRACTEOLATA Hiern in Oliv. Fl. Trop. Afr. iii. 84 (1877).

Hab. Sierra Leone: *Afzelius*! *Don*! *Scott Elliot*, 3922! 5619! Kamerun: *Zenker*, 1189! 2760! *Zenker & Staudt*, 89! Hbb. Mus. Brit., Kew, and Univ. Cambridge.

This species seems to stand upon the border-line between *Laxæ* and *Spicatæ*. In the type plant, collected by Afzelius, the lateral inflorescence-branches are very reduced, but the flowers are in bud. In Zenker's plant (2760) cited above the inflorescence is in the fruiting-stage, but the arrangement is subspicate. In Scott Elliot's plants the lateral inflorescence-branches are relatively well developed, and the inflorescence approaches the *Thyrsoideæ* type. Some difficulty may thus be experienced in applying the clavis to this species; in the introduction special attention has been drawn to this "transitional" species and to others (*supra*, p. 114).

SPICATÆ, sect. nov. Inflorescentia subspicata rachide mediana bene distincta cymis lateralibus sessilibus densifloris axibus pro rata suppressis.

19. B. SPICATA comb. nov. *Pomatium spicatum* Gaertn. f. Fruct. iii. 252. *Wendlandia pilosa* G. Don, Gard. Dict. iii. 519. *B. africana* A. Rich. in Mem. Soc. Hist. Nat. Par. v. 255. *B. Pomatium* Benth. in Hook. Niger Fl. 594.

Hab. Sierra Leone: *Smeathman*! *Vogel*, 161! *Don*! *Smythe*, 235! *Scott Elliot*, 4161! 4176! Senegal: *Heudelot*, 627! 719! Liberia: *Whyte*! *Dinklage*, 2106! *Bunting*, 115! Hbb. Mus. Brit. and Kew.

The species is readily distinguishable by the outstanding red hairs which cover the branchlets, petioles, and leaf-veins, and by the closely pinnate venation.

20. B. RACEMOSA K. Sch. in Bolet. Soc. Brot. x. 127. *Wendlandia racemosa* G. Don, Gard. Dict. iii. (1837) 519. *B. macrocarpa* Benth. in Hook. Nig. Fl. (1849) 394.

Hab. Sierra Leone: *Don*! *Scott Elliot*, 4523! R. Niger: *Vogel*! Batanga: *Bates*, 75! Brass: *Barter*! Calabar: *Thom-*

son, 55! Princes Island: *Mann*! *Welwitsch*, 5086! *Barter*, 1974! Ashanti: *Cummins*, 49! Lagos: *Millen*! Akpanu, S. Nigeria: *Dennett*! Kamerun: *Zenker*, 1544! 1976! 2423! 4150! *Johnston*! Hbb. Mus. Brit. and Kew.

Remarkable for the size of the mature berry, which is over a centimetre long and crowned by a tubular calyx-limb exceeding 2 mm. in length. The lateral cymes are distinctly pedicellate and sometimes relatively lax.

21. B. THONNERI de Wild. & Th. Dur. Pl. Thonner. 44 t. xiii. (1900).

Hab. Congo, Bangalas: *Thonner*, 19.

I have not seen a specimen, but the figure quoted is an excellent one. As the author states, the affinities are with *B. racemosa* and *B. spicata*.

22. B. GLABRATA K. Sch. in Engl. Bot. Jahrb. xxiii. 450 (1897).

Hab. Kamerun: *Zenker*, 811! Hbb. Mus. Brit. and Kew. Liberia, Sinoe Basin: *Whyte*! in Hb. Kew.

There are no flowers or fruits on the type specimens in the National and Kew Herbaria; but Whyte's plant is in full flower and seems to correspond with the description. It is distinctive in the complete glabrousness of the exterior of the corolla, even in bud.

23. B. MONTANA Hiern in Oliv. Fl. Trop. Afr. iii. 83 (1877).

Hab. Fernando Po Island (alt. 7000 ft.): *Mann*, 292! Ashanti: *Thompson*! Buddi, Uganda: *Dawe*, 268! Hb. Kew. Kampala, Uganda: *Scott Elliot*, 7327! Hbb. Mus. Brit. and Kew.

The flower-buds are all deflexed in the specimens examined, much as in *B. retrofracta*, but the leaves are much broader than those of the latter species.

24. B. RETROFRACTA K. Sch. in Engl. Bot. Jahrb. xxiii. 452 (1897).

Hab. Kamerun: *Preuss*, 337! 1279! Hb. Kew. Oban, S. Nigeria: *Talbot*, 236! Hb. Mus. Brit.

Distinguishable from its near allies by the relative narrowness of its leaves.

25. B. SUBSESSILIS Hiern in Oliv. Fl. Trop. Afr. iii. 83 (1877). *B. congolana* de Wild. & Th. Dur. Ann. Mus. Congo, II. i. fasc. 2, 28.

Hab. R. Niger, *Brass*! *Barter*! Congo, Leopoldville: *Dewèvre*. *Sapin*! in Hbb. Mus. Brit. and Kew.

A careful comparison between the examples and descriptions of the two species named urges me to regard them as identical. The authors of *B. congolana* point out, as its only difference from *B. subsessilis*, that the leaves are distinctly petiolate; but this can scarcely be regarded as a character either constant or important enough to separate two distinct species.

The calyx-limb, as in *B. racemosa*, is a prominent feature in the fruit—tubular, erect, entire, about two-fifths of the total length of the berry.

26. B. ÆTHIOPICA Hiern in Oliv. Fl. Trop. Afr. iii. 83 (1877).

Hab. Niamniam-land: *Schweinfurth*, 3274! 3108! Hb. Kew.

The type specimens in the Kew Herbarium are in the fruiting-stage; the berries are closely sessile upon the rachis, constituting a true spike.

27. **B. tenuiflora,** sp. nov. Foliis glabris venis lateralibus paucis distantibus, stipulis inter parvos, inflorescentia stricte spicata cymis distantibus paucifloris, bracteolis obsoletis.

Hab. Bipinde, Kamerun: *Zenker*, 3528! Hbb. Mus. Brit. and Kew.

Frutex (?) ramulis gracilibus teretibus fulvo-sericeo-pubescentibus, foliis ovato-lanceolatis utrinque glabris acuminatis acutis basi brevissime angustatis ca. 14 cm. × 5·5 cm. brevissime petiolatis, stipulis lanceolatis extus dense præcipue super venam mediam prominentem pubescentibus, intus glabris, inflorescentia cymorum pauciflorum sessilium distantium spica rachide dense breviter pubescente bracteolis obsoletis, calyce subglobosa minutiuscula limbo patente brevissime dentata, corollæ tubo pubescente tenuissimo 1·5–2 cm. longo insuper in parte 5 mm. longa campanulata extus densiuscule pubescente lobis brevissimis dilatato.

Distinguished from *B. gracilis*, its nearest ally, by the absence of bracteoles and the pubescence of the corolla.

28. B. GRACILIS de Wild. Miss. Laur. 290 (1906).

Congo, Kiri and Kapinga: *Mission Laurent.*

β. var.? *latifolia* de Wild. Fl. Congo, ii. 170 (1908).

Hab. Congo, Bangala: *F. Demeuse*, 315. Yambua: *M. Laurent*, 1453, 1444.

This variety must remain somewhat doubtful, as no flowering specimen has been seen.

29. **B. cinereo-viridis** K. Sch. MS. in Hb. Mus. Brit. Foliis petiolatis superne hispidulis venaque media dense pilosa, stipulis inter minores, inflorescentia stricte spicata, floribus parvis in fasciculis paucifloris plus minus distantibus, bracteolis apparentibus.

Kamerun: *Zenker*, 4037! *Zenker & Staudt*, 640! Hbb. Mus. Brit. and Kew.

Frutex ramulis strigoso-pubescentibus foliis ellipticis 10–13·5 m. × 4·5–5·5 cm. acutis brevissime acuminatis basi angustatis vel subrotundatis superne hispidulis subtus pubescentibus petiolo 5–6 mm. longo ramulis similiter induto, stipulis oblongis subacutis extus pilosis intus glabratis vix 1 cm. longis, spica ad 20 cm. longa rachide gracillima dense sericeo-pilosa, floribus cylindricis insuper parum ampliatis ca. 8 mm. longis corollæ ore dense villoso, alabastris subulatis vix acuminatis.

Near *B. gracilis*, but readily distinguished by the indumentum of the leaves.

30. **B. oligosperma,** sp. nov. Ramulis pilosis, inflorescentiis

subspicatis, bracteolis calycem fructumque excedentibus, baccis inter minores, seminibus paucis pro rata magnis.

Hab. Nicaragua: *Seemann*, 129! Hb. Mus. Brit.

Verisimiliter arbor, ramulis strigoso-pubescentibus demum glabris nodosis, foliis 7–12 cm. × 3–4·5 cm. obovatis vel ellipticis utrinque angustatis vix nisi juniores acuminatis utrinque præcipue super venas rufo-pubescentibus brevissime petiolatis, stipulis lanceolatis ca. 1·7 cm. longis glabrescentibus acutis, inflorescentiis subspicatis ca. 10 cm. longis floribus in fasciculis paucifloris plus minus distantibus subsessilibus, bracteis linearibus strigoso-pilosis fere ad 1 cm. longis, bracteolis ad 4 mm. latiusculis multo calycem strigulosum excedentibus, ovulis ovarii quoque loculo 3–4, bacca ad 4 mm. diam. matura sparsiuscule hirto-pubescente a calycis dentibus minutis erectis coronata, seminibus pro genere inter maximis valde compressis concavis minutiuscule foveolatis.

I have not seen a flower of this species, but the general habit, the character of the inflorescence, and the structure of the ovary and seeds, leave no doubt that the plant is properly referred to the genus *Bertiera*. The affinities are with *B. gracilis*, from which, however, it is readily distinguished by the seed-character alone. The species is interesting as being the only member of the *Spicatæ* hitherto recorded from the New World.

CAPITATÆ sect. nov. Inflorescentia capitata vel subcapitata axibus omnibus pro rata suppressis.

31. B. Laurentii de Wild. Miss. Laur. 290 (1905–7).

Hab. Congo: *E. Laurent*; *J. Gillett*, 1975, 2789; *L. Gentil*; *Sapin*; *Chevalier*, 11,152! Hbb. Mus. Brit. and Kew.

A "transitional" species, *supra*, p. 114.

32. B. globiceps K. Sch. in Engl. Bot. Jahrb. xxiii. 451 (1897).

Hab. Kamerun, Lolodorf: *Staudt*, 128! *Zenker*, 4143! Hbb. Mus. Brit. and Kew.

33. B. capitata de Wild. Fl. Congo, ii. 169 (1908).

Hab. Congo: *M. Laurent*, 131, 1260; *L. Pynaert*, 410.

According to the description, this species is distinguished readily from *B. globiceps* by the very accrescent pedicel and large size of the fruit, as well as by the short corolla-tube (6 mm.).

When the foregoing account was in the printer's hands, the following two additional species were described by Krause, from specimens collected in the Duke of Mecklenburg's expedition to Central Africa in 1907–8. According to the description, both appear to belong to the *Spicatæ* section; I have, unfortunately, had no opportunity to examine either:—

B. iturensis Krause in Wiss. Ergeb. Deutsch. Tent.-Afr.-Exp. 1907–8, ii. 324 (1911).

Hab. Ituri: *Mildbraed*, 3047.

This species is described by the author as recognizable by its small leaves and large foliaceous stipules. The measurements of the narrow-oblong or lanceolate oblong leaves are given as 14 to 18 cm. long and 4 to 6 cm. broad, with petiole from 1 to 1·2 cm.

long. The stipules measure 1·2 to 1·8 cm. in length. The species is apparently very near to *B. retrofracta*.

B. Mildbraedii Krause, *loc. cit.* 325.

Hab. Aruwimi: *Mildbraed*, 3212.

The most nearly related species is said to be *B. subsessilis*, the distinguishing features being the leaf-shape and the indumentum of the younger parts.

NEW AND RARE WEST AUSTRALIAN PLANTS.

By Alexander Morrison, M.D.

Calandrinia schistorhiza, n. sp. Radice tuberoso, foliis omnibus radicalibus, scapis nudis unifloris, staminibus numerosis, styli ramis 3, ovulis numerosis.

Dwarf plant with tuft or rosette of leaves seated on the upper end of the tuberous root, which is forked or irregularly divided into several lobes or branches, usually tapering downwards to a point from which the fibres are continued. Leaves all radical, fleshy, about 1·5 cm. long, with a broad obovate lamina on a petiole twice as long. Scapes up to seventeen in number, simple, leafless, flexuose, 3–4 cm. long, each bearing one large flower at its summit; bracts in two or three pairs, or verticils of three, at the nodes—exceptionally, four pairs with a pair of flowers in the uppermost—broadly ovate with a short acuminate often recurved point. Pedicels 7 mm. long, dilated at the top, buds acutely pointed; sepals orbicular, thin, about 5 mm. diam.; petals five rather more than twice as long as sepals, broad, pink; stamens numerous, anthers oblong; style divided to near the base into three long, linear, stigmatic branches, ovary subglobose, much shorter than sepals in expanded flower, ovules numerous.

Boulder, Sept.; *W. D. Campbell.*

In affinity this plant is very close to *C. primuliflora* Diels, agreeing with it in most of the essential characters, excepting the short union of the style-branches at the base, as in *C. Lehmanni*, and the smaller number of pairs of bracteoles on the scapes. It is, however, a coarser plant, with the leaves and flower-scapes, as a rule, in direct contiguity with the upper end of the tuber, although sometimes the upper part of the root is narrow for a short distance downward, then expands into the more fleshy tuberous portion; but in both of the species referred to the tuberous condition is due merely to an accumulation of succulent tissue round the fibres of the root, which are opened out in the bulbous part, and continue as fibrous threads on emerging at the lower end. The branched condition and rough surface of the tuber of the Boulder plant, with the absence in most specimens of the "rootstock" or "rhizome," offer a strong contrast with the underground portion of *C. primuliflora*; but the similarity in structure of the floral organs suggests a query as to whether a difference in the constitution of the soil, such as the presence of salt, might not account for the peculiarities of the root in the case of the former. Mr. Campbell, however, has informed me that the specimens were found in dry rocky places, similar to the habitat of *C. primuliflora.*

CALANDRINIA CREETHÆ Tratman. Floribus in paniculas foliosas digestis, sepalis latioribus quam longis, petalis 6 post floritionem supra ovarium calyptratim persistentibus, staminibus 12 disco hypogyno insidentibus, antherarum loculis oblongis, styli ramis 4 plumosis.

A prostrate succulent herb of a bright coral red colour, with sixteen to twenty-one leafy flowering-branches radiating to a diameter of 8–10 inches. Radical leaves in a rosette, terete-clavate, longest 3·5 cm. tapering downwards from a thickness of 5–6 mm. near the top to a very short smooth rounded petiole; stem-leaves sometimes in verticils of three or occasionally four on the main stem and at base of branches, or also one at base of branches of inflorescence, clavate to obovoid or pearl-shaped, sometimes slightly oblique or falcate, very obtuse, with a minute slender point or filament at the top, the attachment to the stem effected through a thin laterally expanded flat and clasping basal portion of the petiole.

Flowering-branches dividing in the upper half and forming a panicle, the branches of which bear unilateral racemes of 1·5–4 cm., containing six to eight flowers, or sometimes dividing at the top di- or tri-chotomously with a flower in the fork; pedicels terete, thickened at top, 0·5–1 cm. long, bracts minute, broad, scarious; sepals 2, broader than long, red, with scarious margins, 2 × 3 mm.; petals 6, ovate, obtuse or subacute, pale purplish, 5 × 3 mm.; stamens uniformly 12, the inner 6 opposite the petals and seated on the ring-like margin of the hypogynous disk, the outer 6 alternating with them, filaments slender and tapering, from half to two-thirds as long as petals, the slender tip attached to the narrow bar-like connective on the inner side, anther-cells oblong, distinct and separate except at the connective, dehiscing by longitudinal slits and everted when the pollen is shed; ovary conical-semi-ovoid, 2 mm. long in the opened flower and nearly as broad at the base, 1-celled with numerous almost globular ovules, style divided to the base into four branches, cohering till the pollen is shed, then spreading to 6 mm. diam., plumose from the base on the inner side with long smooth stigmatic hairs; the dried petals forming a calyptra on the capsule, which at that stage is 4 mm. in length.

Laverton, about 480 miles east from coast at Champion Bay, October; *Miss Creeth.*

This elegant plant has its own combination of floral characters, but agrees with *C. quadrivalvis* F. Muell. and *C. uniflora* F. Muell. in having its flowers in panicled racemes and provided with four styles and six petals. The stamens, however, are definite, as in *Claytonia,* though in that genus they are five in number and seated on the base of the petals, while the seeds are few. The position of an outer circle of stamens alternates with the petals, and an inner circle opposite to them is found also in *C. Menziesii* Hook., a Western American species, but in that case the petals are five in number, and while the outer five stamens are alternate, the remaining seven are opposite to the petals, of which the two posterior have a pair in front instead of one.

INDIGOFERA BOVIPERDA Morr. Foliorum foliolis 5 fol. terminali ceteris majori, racemis axillaribus, calycis lobis quam tubus longioribus acutis, legumine recto cylindrico.

A shrub under 2 ft. high, in advanced fruiting stage, clothed all over with a tomentum of centrally attached hairs, and more or less rusty. Leaves unequally pinnate, the petiole with common rachis grooved above, from 14 to 38 mm. in length, leaflets 5 on petiolules of about 2 mm., broadly oblong-obovate, mostly cuneate towards the base, slightly retuse with a short dense point, under surface dark grey with a short tomentum, midrib and veins prominent, with corresponding depressions and thinner pubescence on upper surface, lower pinnæ about 6 mm. long, the terminal one up to 12 mm.; stipules of about 2 mm. and stipellæ both rigidly setaceous. Flowers numerous, shortly pedicellate on long somewhat rigid racemes which are pedunculate in the axils, and vary from 2 cm. to 12 cm. or even 19 cm. in length, pedicels about 1·5 mm. long and recurved in fruit; calyx-tube under 1 mm. with subulate-pointed lobes of about 2 mm.; corolla not seen; ripe pod straight, terete, sessile, obtuse at both ends but mucronate at top, 12–28 mm. long and 2–3 mm. thick, brown, densely tomentose, sutures somewhat thickened, seeds usually eight in number, subglobose or truncate-cylindrical and papillar-rugose on surface.

Ashburton River, North-west Australia.

The nearest affinity of this species is to *I. saxicola* F. Muell. and *I. Georgei* E. Pritz., having like them five stalked leaflets; but the calyx-teeth are longer than in the former, while, as compared with the latter, the leaves and pods are shorter, and the racemes attain a much greater length.

The plant came under special notice from having caused the death of one hundred and twenty cattle out of a "mob" of five hundred while travelling between Nanutarra, on the Ashburton River, and Uaroo, on the way towards Carnarvon at Shark's Bay. A preliminary analysis of the dry plant by Mr. E. A. Mann, Government Analyst, showed the presence of a poisonous alkaloid.

Drosera occidentalis, n. sp. Foliis rosulatis lamina orbiculari peltata donatis, stipulis trifidis, scapis bifloris vel unifloris et tunc bractea ad basin pedicelli onustis, sepalis petalis et staminibus 5, stylis 5 simplicibus.

A minute plant, found in sandy soil in a newly cultivated wheat paddock. Leaves to about twenty in number, rosulate, lamina orbicular, eccentric-peltate, ciliate with long glandular hairs, very concave, about 1 mm. diam.; petiole about 4 mm. in length, flattened below but slender at top, the rosette spreading to a diameter of about 10 mm.; stipules shining white, forming a bud of about 2 mm. long but not dense, divided to the middle into three oblong-lanceolate lobes.

Scapes 2–3 from the rosette, leafless, slender, studded with very short glandular hairs, 17 mm. or less in height, and bearing at the top, on pedicels about as long as the calyx, two flowers, or only one, with a bract at base of pedicel. Sepals 5, glabrous, ovate, obtuse, with margin from middle upwards coarsely toothed or crenate, about 1 mm. long, enlarging to 1·75 mm. after flowering; petals 5, white, oblong-ovate or -obovate, obtuse, 2 mm. or a little more in length; stamens 5; styles 4, slender at base, clavate upwards, longer than sepals.

Beenup, between Canning and Murray Rivers. November.

This species resembles *D. pygmæa* DC. in its minute size and general aspect, but also more definitely in its leaves and stipules, as well as in the number and clavate character of the four styles. It differs, however, in its otherwise 5-merous symmetry, and in the presence of more than one flower, and of bracts, on the scape. These differences exclude it from Planchon's Sec. ii. *Bryastrum*, containing *D. pygmæa* alone; but while in the form of its organs it shows a close similarity to that species, its differences relate rather to the numbers of parts in the floral organs, showing therein an approach to perfect isomerism, which is less common in the genus than a variability in the number of parts, not only in individual plants of a species, but also between one species and another. *D. occidentalis* would best form a subsection of *Bryastrum*, agreeing with *D. pygmæa* in its four styles and in the leaf lamina, but differing in its otherwise 5-merous symmetry.

Angianthus acrohyalinus, n. sp. Caulibus erectis a basi foliosis griseo-lanato-tomentosis, foliis alternis lineari-lanceolatis amplexicaulibus, capitulorum glomerulis cylindraceis bracteis paucis stipatis, capitulis 2-flosculosis, pappi setis 5 plumosis, achæniis turgidis.

An erect plant, reaching 31 cm. in height, somewhat woody towards the base, with numerous flexuose leafy branches from the base upwards, clothed with a grey woolly tomentum. Leaves alternate, somewhat rigid, narrow-lanceolate, induplicate, suddenly contracted below to a stem-clasping base and somewhat decurrent, spreading above the base, then incurved to a stiff hooked point, beyond which is often to be seen a thin hyaline yellow expansion, midrib and two lateral veins prominent on the under surface, maximum length 5 cm., breadth 0·6 cm. at base, but mostly smaller and diminishing upwards to flower-heads.

Flower-spikes terminal, single, ovoid to cylindric-obovoid, yellow, the largest 2·2 × 1·2 cm., subtended by a circle of leafy bracts, seldom exceeding the width of the spike, and showing the hooked point and scarious appendage observed in the leaves. Florets two in each partial head, the two innermost involucral bracts hyaline with an opaque midrib, flat, spathulate and narrower than the outer, with a short incurved hyaline yellowish lamina, bracts and florets 3–4 mm. long; corolla 5-lobed, expanding towards the top, slender below, but swollen at base over the ripe achene; pappus of five capillary bristles nearly as long as the corolla, plumose except towards the base, where they are dilated and united in a ring with one or two teeth between each two bristles; achene almost cylindrical but tapering slightly to base, minutely papillose.

Globe Hill Station and Minderoo, Ashburton River, October.

The singular appendage on the tip of the leaf of this plant appears to be homologous with the coloured lamina of the involucral bracts, forming the ray in so many of the *Gnaphalicæ*, although at first sight it looked as if formed of inspissated resinous secretion from the horny tip of the leaf. Its presence on the small leafy bracts of the general involucre seems, however, to prove the transition of leaf to floral bract.

The affinity of this species is evidently with *A. tomentosus* Wendl., particularly in the shape and colour of the spikes, and in the form of the pappus.

Helipterum cirratum, n. sp. Planta humilis, caulibus ascendentibus simplicibus vel rari-ramosis, ramis monocephalis, foliis amplexicaulibus lineari-lanceolatis obtuse acutis ut caulis indumento lanoso obtectis, involucri hemisphærici phyllis ext. ovato-lanceolatis scariosis radiantibus, flosculis exsertis, pappi setis 10 satis elongatis inferne dilatatis ima basi connatis, achæniis villosis.

Dwarf plant with one or more stems, 4 cm. or less in length, ascending from the base, simple or once branched near the top, a single head of flowers terminating each branch shortly above the uppermost leaves. Leaves linear-lanceolate, erect, along with the stems enveloped in fine wool, subacute, sessile and stem-clasping, 2·5 cm. or less in length, some of the lower reaching but not exceeding the flower-heads, which are hemispherical and spread to a diameter of 1·5 cm. Outer involucral bracts thin, scarious, and shining, with a slight brownish tinge, ovate-lanceolate, the inner on short opaque thinly woolly claws, their laminæ lanceolate, subacute, fluted, pure white, up to 8 mm. long, the innermost somewhat shorter than the intermediate. Florets exceeding the involucre; pappus nearly as long, composed of ten bristles shortly united at base, each broad and flat below but gradually narrowed to the summit, shortly plumose from the base, the cilia at the top much longer, somewhat tufted and more spreading; achenes densely covered with long silky hairs.

On flat between Globe Hill and Uaroo Stations, Ashburton River, October.

This plant, which was desiccated and brittle when found, belongs to Sec. *Euhelipterum* of the genus, and its nearest affinity is with *H. Pyrethrum* Benth., having the same, though longer, dilated pappus, and showing a general similarity in the flower-heads. It may be mentioned, by the way, that *H. Pyrethrum*, as found about the Lower Swan River, has a distinctly fistulose stem, readily noticed in the fresh state, a characteristic that does not appear to be noted in any description of the plant.

JOHN VAUGHAN THOMPSON
(1779–1847).

By James Britten, F.L.S.

A discussion on "The terms Polyzoa and Bryozoa," which occupied the attention of the Linnean Society on three evenings (March 2, 16, May 4) of its last session, is reported at length in the *Proceedings* of that session (1910–11). It includes a paper by the Rev. T. R. R. Stebbing which, although headed "On John Vaughan Thompson and his Polyzoa," is naturally enough confined to the consideration of the author in relation to that more important portion of his work. But as neither here nor in the *Dictionary of National Biography* nor in *Symbolæ Antillanæ* is Thompson's botanical work recognized, and the references to him in the *Biographical Index* are very meagre, it may be worth while to put together what is known of him from a botanical point of view.

John Vaughan Thompson was born at Berwick-upon-Tweed on November 19, 1779. He studied in the University of Edinburgh in 1797 and 1798, taking anatomy, surgery, and chemistry in the former year, and anatomy, midwifery, and botany in the latter. In 1799 he "joined the Prince of Wales's Fencibles as assistant surgeon, and on 15 Dec. 1799 was ordered to sail with the 37th foot for Gibraltar. Three months later his regiment embarked for the West Indies and Guiana. . . . He was made full surgeon in 1803" (Dict. Nat. Biogr.). He remained in the West Indies until the close of 1809, when he returned to England.

Thompson must early have acquired considerable proficiency in botany. His *Catalogue of Plants growing in the Vicinity of Berwick upon Tweed* was prepared before he left England—*i. e.* at or before the age of twenty—and shows a very complete knowledge of the plants of that region and of the literature of the period: the pretty coloured group which adorns the title-page and a plate (also coloured) and dissections show him to have been a capable artist. The work is dedicated to William Percival Pickford, Esq., of Edinburgh, "to whom the author feels almost entirely indebted for his early initiation into the principles and practice of scientific botany." "Although by much the greater part of the habitats were the fruits of my own excursions," he tells us in his preface (which is not dated), "yet for a few I was originally indebted to my father; a few more were pointed out by William Percival Pickford Esq." "The references to my Hortus Siccus," he says, "have been subjoined, in consequence of my intention of depositing it in the shop of Mr. Reid, stationer in Bridge-street, Berwick, where it will be at all times accessible to such ladies and gentlemen as may wish to consult it." He acknowledges "personal and kind aid" from Smith, Sowerby, and Dickson, and makes special mention of "the facilities which Lord Seaforth opened to me in the investigation of doubtful species, and the many obligations I owe to this source." Seaforth had by this time (1807) returned to London from Barbadoes, where he had been Governor from 1801 to 1806,* and it seems probable that among these "obligations" was that of superintending (and possibly of subsidizing) the Berwick Flora, which was printed and published in London in that year. In the same year Seaforth communicated to the Linnean Society, of whose council he was then a member, an account of some West Indian species of *Piper*, prepared by Thompson, who had proposed to make a complete study of the genus but had been hindered by his "professional occupations." Two new species are described and figured as new, one—*Piper quadrangulare*—being still maintained, although now transferred to *Peperomia*—a genus which Thompson refused to accept: the paper appeared in Trans. Linn. Soc. ix. 200.† It was in this year that Thompson became an Associate of the Linnean Society, proceeding to Fellowship in 1810.

In 1812 Thompson went to Madagascar and Mauritius, where he remained for some years. During this period he sent dried plants to Robert Brown, which are in the National Herbarium. Among these is the interesting passifloraceous plant which Brown named in compliment to him *Thompsonia* (Trans. Linn. Soc. xiii. 221, 182). Brown merely indicated the character which he thought distinguished this generically from *Deidamia*, to which it is now generally referred (as *D. Thompsoniana* DC.); but it was not until 1875 that Masters published in this Journal (xiii. 161) a full description and figure of the plant, based upon Thompson's original specimen. Thompson himself had sent specimens to Lambert, but these cannot be traced. A note on *Acacia Lebbek* by Grandidier in Hist. Nat. Pl. Madagascar, i. 65, runs: "Cet arbre semble avoir été introduit à Madagascar par S. [sic] V. Thompson, envoyé en 1814 auprès de Radama I^{er} par Sir Robert Farquhar avec des cadeaux, au nombre desquels figurait un sac des graines de *Bois noir* destinées à être semées dans les prairies de Madagascar où il n'existait point d'arbres."

In 1813 Thompson was at Gibraltar, as we learn from a reference to him by Salisbury in *Liriogamæ*, who, speaking of *Narcissus viridiflorus*, says: "This curious plant was introduced in the time of Parkinson, and again in 1813 by Dr. J. V. Thompson, who, being told by me that Schousboe had seen it in the neutral ground between St. Rocque and Gibraltar, brought several hundred bulbs here from thence" (p. 107).

"After his return in 1816 Thompson settled at Cork as district medical inspector, and completed those wonderful discoveries of the life-histories of the marine invertebrata of the Cove of Cork, which made his name famous" (Dict. Nat. Biogr.). Any discussion of these would be out of place here; reference may be made to the *Proceedings* of the Linnean Society mentioned at the beginning of this paper, where the spelling of the sympode genus *Vaunthompsonia*, named in his honour by Spence Bate, is discussed. In 1835 Thompson went to Sydney in charge of the convict medical department, where he died on Jan. 21, 1847. While in New South Wales he interested himself in the growth of cotton and in varieties of the sugar-cane, on which he published observations in the Journal of the Agricultural Society of India in 1842–3.

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* Thomas Williams Simmonds was in Seaforth's suite as naturalist: he died of fever in Trinidad in 1804.

† The paper on British birds in the same volume, attributed to Thompson in Dict. Nat. Biogr. on the faith of a false entry in R. S. C. v. 958, is by George Montagu.

Francis Mackenzie Humberston, Lord Seaforth (1754–1815).

I take this opportunity of supplementing the very incomplete account in Dict. Nat. Biogr. and in *Symbolæ Antillanæ* of Lord Seaforth, who has been referred to in the preceding observations, confining myself to his relations with botany: a sufficiently full account of his general career will be found in Dict. Nat. Biogr. xxviii. 205.

The records of his active botanical work relate almost entirely to the period of his Governorship of Barbadoes (1800–1806), although he had evidently before this interested himself in science, as, besides the help which he seems to have given to J. V. Thompson (vide supra), he was elected F.R.S. in 1797 and F.L.S. in May, 1796. In Rees's *Cyclopædia* he is described as "a liberal and very intelligent cultivator and patron of botany, who has enriched the gardens of Britain with numerous West Indian rarities"; and Brown, in dedicating to him the genus *Seaforthia*, styles him "botanices periti cultoris et fautoris." Dawson Turner named in his honour *Fucus Seaforthii*, which Seaforth "collected, with many others, during his residence as Governor at Barbadoes, where he obligingly exerted himself in procuring materials for this work" (*Fuci*, ii. 130). D. Don, in his account of Lambert's collections, mentions "several hundred living plants brought home by Lord Seaforth on his return from his government of Barbadoes, and presented to Mr. Lambert: many of these flowered in the stove at Boyton, and were added to the Herbarium." "A long list of West Indian plants sent home by Seaforth in 1804–06 forms Brit. Mus. Add. MS. 28610 f. 20 et seq." (Dict. Nat. Biogr.).

BIBLIOGRAPHICAL NOTE.

L.—Pohl's 'Tentamen Floræ Bohemiæ.'

The contributions of Johann Baptist Emanuel Pohl (1782–1834) towards a knowledge of the Bohemian flora, though important, have been very generally overlooked by systematic botanists. Pohl published several papers on this subject in the *Botanische Zeitung* (1805–6) and in Hoppe's *Neues Botanisches Taschenbuch*

(1806–7), but by far his most important contribution is the *Tentamen Floræ Bohemiæ*. This work was prepared for publication in the *Abhandlungen der königl. böhmischen Gesellschaft der Wissenschaften*; it did not appear there, however, but was issued subsequently in two volumes. The first of these, the manuscript of which (with the exception of the preface and bibliography) was ready for printing in 1806 (Maiwald, *Geschichte*, 97 (1904)), appeared in 1809, and was reissued in 1810. The second volume, the manuscript of which was ready in 1811, appeared in 1814, and was reissued in 1815. A copy of the first issue is in the botanical library of the British Museum (Natural History), and is of special interest, as it contains an autograph presentation note by Pohl dated "Prag, 19 Sept. 1809." Its title reads "Tentamen Floræ Bohemiæ. Versuch einer Flora Böhmens von J. E. Pohl. . . . Erste [and Zweyte] Abtheilung. Für die Abhandlungen der königl. böhmischen Gesellschaft der Wissenschaften. Prag. 1809 [and 1814]. Gedruckt bey Gottlieb Haase." It was reissued without alteration or addition by G. W. Enders & Co., of Prag, in 1810 and 1815; it is to this reissue that Pritzel refers in the *Thesaurus* (ed. 2. n. 7229), and copies of it are in the libraries at Bloomsbury and Kew. Pohl seems to have based his work on H. A. Schrader's unfinished *Flora Germanica*, 1806; part of the cost of publication was defrayed by the Königl. Böhmische Gesellschaft der Wissenschaften.

The work is as interesting to the botanist as to the bibliographer. Many of the names which were here first published have been omitted from the *Index Kewensis*, and it is obvious from the mode of citation of those included that the compiler did not consult the work itself, but quoted it at second-hand. This fact seems to warrant the re-publication here of the names first published in the *Tentamen*. These are given in the following list, which includes one British plant—"*Cladium Mariscum* mihi," with full description, synonymy, &c., which antedates Robert Brown's publication in *Prodr. Fl. Nov. Holland.* p. 236 (1810). It has not been thought necessary to give a list of the species cited in the genera *Gallion*, *Lysimachusa*, and *Gentianusa*, as these differ only in their terminations from names already in use under *Galium*, *Lysimachia*, and *Gentiana* respectively. The first column contains Pohl's new names with a reference to the *Tentamen*, and in the second are their citations as given in the *Index Kewensis*, with their synonyms:—

POHL, TENTAMEN.	INDEX KEWENSIS.
Circæa pubescens (i. 6).	"Pohl, ex Steud. Nom. ed. 2, i. 366" [1840; ed. i. 198 (1821)] = *C. lutetiana* L.
Veronica plicata (i. 15 and errata [post 302]; fig. 1) = *V. Schmidtii* Pohl (in Hoppe, Neuen Taschenbuche, 1807, 115).	*V. plicata* is quoted correctly; *V. Schmidtii* "ex Schult. Mant. i. 108" [1822] = *V. Chamædrys* L.

Pohl, Tentamen.	Index Kewensis.
Veronica pinnatifida (i. 17).	Correctly quoted = *V. austriaca* L.
Salvia distans (i. 29).	"Pohl, ex Steud. Nom. 725" [1821] = *S. austriaca* L.
Cladium Mariscum (i. 32).	"R. Br. Prodr. 236" [1810] = *C. germanicum* Schrad.
Valeriana exaltata Mikan f. and *V. sambucifolia* Mikan f. (i. xvi, 41).	Correctly quoted as ex Pohl.
Iris vulgaris (i. 46).	"Pohl, Tent. Fl. Boh.; ex Schult. Mant. i. 304" [1822] = *I. germanica* L.
Iris extrafoliacea Mikan sen. (i. 47).	"Mikan f. ex Roem. & Schult. Syst. i. 466" [1817] = *I. aphylla* L.
Poa latifolia (i. 94).	Correctly quoted = *P. Chaixi* Vill.
Elymus cylindricus (i. 122) = *E. europæus* L.	Omitted.
Gallion (i. xix, 126, 137; ii. iii.) = *Galium*; seventeen species enumerated.	Omitted.
Soldanella montana Mikan (i. 191).	"Willdenow, Enum. Hort. Berol. 192" [1809].
Cyclamen variegatum (i. 192) = *C. europæum* L.	Omitted.
Lysimachusa (i. 163, 194) = *Lysimachia*; five species enumerated.	Omitted.
Campanula paniculata (i. 207).	"Pohl, ex A. DC. Monogr. Camp. 244" [1830] = *C. sibirica* L.
Vincetoxicum nigrum mihi (i. 238). Moench used this name for the same plant in 1802.	"Moench, Meth. Suppl. 313" [1802].
Gentianusa (i. 167, 248) = *Gentiana*; fifteen species enumerated.	Omitted.
Athamanta hirsuta (i. 270) = *A. cretensis* L.	Omitted.
Allium tenuifolium (ii. 10) = *A. Schœnoprasum* L. β.	Omitted.
Ornithogalum Zauschneri (ii. 14).	Correctly quoted = *Gagea pygmæa* Salisb.
Acer Trattinnikii (ii. 66) = *A. campestre* L.	Omitted.
Mespilus pubescens (ii. 164) = *M. germanica* L.	Omitted.

Pohl, Tentamen.	Index Kewensis.
Rosa varians (ii. 171) = *R. gallica* L.	"Pohl, ex Link, Handb. ii. 93 [1831]. (Quid ?)."
Potentilla Guentheri Spreng. (ii. 185).	"Pohl, Tent. Fl. Boh. ii. 185" [1814]; it should be quoted as of Sprengel, Pugillus, i. 34 (1813).
Aconitum Clusii (ii. 208) = *A. Napellus* L. (*A. neubergense* DC.).	"Reichb. Uebers. Acon. 22" [1819] = *A. Napellus* L. (*A. formosum* Reichb.).
Pulsatilla Hackelii (ii. 213).	"Pohl, ex Maly, Fl. Stir. 2 [1838]; Ledeb. Fl. Ross. i. 20 [1842]" = *Anemone Pulsatilla* L. The name in Maly is *Anemone Hackelii*.

F. G. Wiltshear,
British Museum (Nat. Hist.).

SHORT NOTES.

Salix reticulata in Wales.—In the Power collection in the Herbarium of the Holmesdale Natural History Club, Reigate, an example of *S. reticulata* exists labelled, "N. Wales. Cader Idris." Botanists visiting that fine mountain, which rises to 2929 ft., would do well to try and confirm this record, as at present no other exists for Wales; the Cambrian localities mentioned by Ray for this plant really refer to *S. herbacea*.—C. E. Salmon.

International Botanical Congress.—On March 21st a large and representative meeting of British botanists was held at the rooms of the Linnean Society for the purpose of electing officers and a general committee to make arrangements for the Fourth International Congress, which is to be held in London in 1915. Lt.-Col. Prain presided, and the following officers were elected:—Presidents: Prof. F. O. Bower, Lt.-Col. Prain, and Prof. A. C. Seward. Treasurer: Sir Frank Crisp. Foreign Secretary: Dr. O. Stapf. General Secretary: Dr. A. B. Rendle. A large and influential general committee was formed, which, it is proposed, will meet on May 17th to consider the election of an executive committee and other matters.

REVIEW.

Untersuchungen über Pfropfbastarde. Dr. Hans Winkler. pp. viii. + 186. Jena: G. Fischer. 1912.

Professor Winkler has undertaken the arduous task of writing a comprehensive account of our present knowledge of

Graft Hybrids: the work is to be completed in three parts, of which the first is now before us. It deals with the direct reciprocal influence of the scion and stock upon each other, and its compilation must have been both laborious and irritating, involving as it does the collection and criticism of a great mass of unscientific data with which, up to the present, the serious study of this largely horticultural subject has been cumbered. That Professor Winkler has produced a useful *résumé* of the literature is certain: the chief criticism that can be levelled at his book is the charge of prolixity—a demerit of less importance in a country where copious verbiage is habitual, but objectionable to English readers. The definition of the concept of a hybrid would seem to be unnecessary and laboured, and many of the citations might have been treated much more summarily. Fifty pages are devoted to galls, deformations through parasites and lichens—subjects whose connection with graft-hybridism is slender: and even here the work of Marshall Ward on bridging species is unnoticed, though this is one of the clearest cases in which the physiological constitution of a parasite may be permanently altered by its sojourn on a particular host. The main conclusion of the work is that, though there is evidence of the transfer of certain organic substances through the fusion-surface (even of a "virus" in the case of infectious variegation), yet there is no known instance in which the hereditary tendencies of either graft-symbiont have been affected by their association with the other: the changes often observed in the scion being of the same nature as the production of habitat-forms. Professor Winkler includes an account of some new experiments of his own in which by certain devices one plant was made holoparasitic upon another for long periods, but without modification of its biotype.

The forthcoming parts of Professor Winkler's book will doubtless present a less depressing record of inconclusive experiments, lack of controls, and untrustworthy data generally; for we are promised an account of that aspect of the subject in which Professor Winkler has been a pioneer and in which, thanks to his efforts and those of Professor Baur and others, a body of facts of striking novelty and importance has been acquired: namely, the discoveries with regard to chimæras and related phenomena, which have solved many old problems and have given rise to new.

R. H. C.

BOOKNOTES, NEWS, &c.

At the meeting of the Linnean Society on March 21st, Mr. H. N. Dixon showed a series of plants from South Portugal, stating that the plants shown were collected on a botanical visit to Algarve in company with Mr. W. E. Nicholson in May, 1911. The trip was mainly taken with a view to bryophytic study, and the phanerogams were only incidentally collected. They were exhibited principally to draw attention to the method of mounting in some instances, certain of the specimens being mounted on sheets of black paper, instead of the ordinary white. In certain cases, as for instance with white and yellow flowers, or with many grasses, the colour of the flower is shown up much better by the contrast; and in others, where this is not conspicuously the case, the black background produces a restfulness to the eye which probably, quite apart from colour contrast, is an advantage. It is not suggested that in all cases, or for herbarium purposes, there is any advantage gained, but for exhibition purposes and for a certain class of plant it seems an improvement on the ordinary white sheet. The surface should of course have as little glaze as possible, and a paper should be chosen which has been found to bear considerable exposure to light without discoloration.

Mr. H. W. Ridley has returned to England having retired on a pension from the Directorship of the Botanic Gardens, Singapore, a post which he had held since 1888. The older generation of botanists will remember that before leaving England Mr. Ridley spent some years as an Assistant in the Department of Botany of the British Museum; during his period of service, he assisted in transferring the Collections from the old Museum at Bloomsbury to the new Natural History Museum at South Kensington. During his term of office in the East Mr. Ridley has found time for botanical exploration in the Malay Peninsula, and has sent large series of specimens to the herbaria both at Kew and the British Museum.

Acting on behalf of Miss Fryer, Mr. Charles Bailey has transmitted to the Department of Botany of the British Museum the valuable collection of British Potamogetons made by the late Mr. Alfred Fryer. The collection contains more than 5000 sheets of specimens, beautifully prepared and selected to illustrate the remarkable variation in the different species and forms. It is much to be regretted that Mr. Fryer was unable to complete his Monograph of the British Pondweeds, but it is matter for congratulation that his working collection has been preserved in excellent condition, and having been presented to the National Herbarium will be available for study.

At the Royal Geographical Society's meeting on April 22nd, Mr. W. E. Kitson gave an interesting account of his work in Southern Nigeria. Mr. Kitson spent five years in the country in Government service, but found time to make valuable observations on the geology and natural history of the province, as well as on its inhabitants. He has presented a small collection of plants to the National Herbarium; among them are some interesting additions to the flora, including a few novelties.

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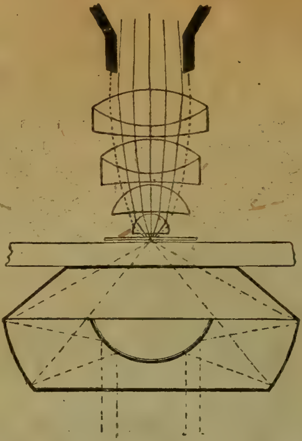

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THE JOURNAL OF BOTANY

BRITISH AND FOREIGN

EDITED BY

JAMES BRITTEN, K.S.G., F.L.S.

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Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains. In 1896 it became necessary to increase the size of the Journal, owing to the number of papers sent for publication: the number of plates was at the same time augmented.

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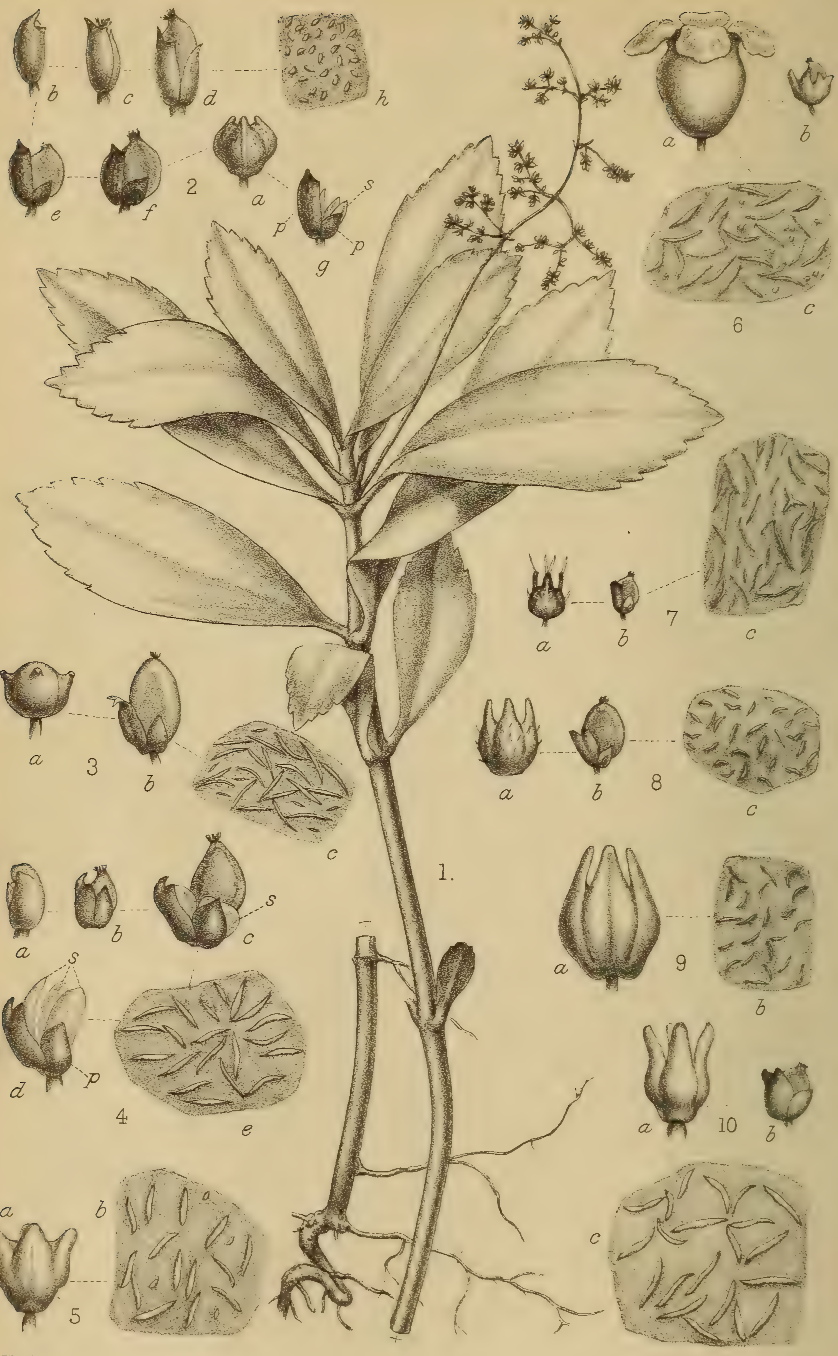
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New Species of Pilea from Jamaica.

NEW PLANTS FROM JAMAICA.

By W. Fawcett, B.Sc., F.L.S., & A. B. Rendle, F.R.S.

(Plate 518.)

The Trustees of the British Museum having consented to issue a complete *Flora of Jamaica* as a Museum publication, we are now engaged on the preparation of the first volume dealing with the Dicotyledons. As the *Flora* will be written entirely in English, we propose to publish the Latin descriptions of the novelties in this Journal; of these the following is an instalment.

Peperomia crassicaulis. *Caulis* crassus. *Folia* (in sicco) coriacea, obovato-elliptica, apice obtusa, interdum leviter emarginata, basi cuneata, in petiolum decurrentia, nervo mediano subtus prominenti et in petiolum decurrente. *Spicæ* sublaxifloræ, tandem foveolis ellipticis cum marginibus lignosis reticulatis. *Bracteæ* ellipticæ vel rotundatæ. *Stylus* lanceolato-acuminatus. *Baccæ* sessiles, ellipsoideæ, subovatæ, verruculosæ, apice cum scutulo plano subobliquo instructæ, stigmati subcentrali, rostro subulato, curvato, baccæ subæquilongo. *P. obtusifolia* Griseb. Fl. Brit. W. Ind. 166 (in part). Type in Herb. Mus. Brit. and in Herb. Jam.

Stem rooting below, erect, simple or with 2 or 3 branches, to 70 cm. l., to 8 mm. br. *Leaves* with 4–8 nerves pinnately arranged on each side, 1 or 2 lower pairs springing from near the base, apex slightly puberulous, blade 4·5–12 cm. l., 2·5–5 cm. br.; stalk to 3 cm. l. *Spikes* terminal, geminate to paniculate; rhachis 7–16 cm. l., 2·5–3 mm. br., common peduncle 4–8·5 cm. l.; peduncles 2–4 cm. l. *Berries* 1–1·25 mm. l., ellipsoidal.

Hab.—In peat in shady woodland, and on decaying trunks of trees, *Macfadyen*! John Crow Peak, J. P. 1481, *Hart*! Morse's Gap, 4900–5000 ft.; Greenwich, 4500 ft., *Harris*! 8104, 8321, 10,140 (in part); Morse's Gap, *G. Nichols*! — Cuba (*Wright*, no. 1689).

Near *P. alpina* A. Dietr., but distinguished by the larger elliptical leaves, and the smaller bracts more numerous at same level.

Ficus mamillifera Warb. var. hirsuta. *Stipulæ* puberulæ, dorso hirsutæ. *Bracteæ* hirsutæ. *Receptaculi* quam in typo minores, 7 mm. longi, 11 mm. in diam.

Hab.—Grierfield, near Moneague, *Britton*, 2364!

The species was founded by Warburg (see Urban, *Symbolæ Antillanæ*, iii. 470) in 1903 on three specimens collected by Mr. W. Harris in different parts of the Blue Mountains. Since then it has been found in two localities in the extreme west of the island by Mr. Harris, and in the extreme east by Dr. Britton and Mr. Harris. Specimens collected many years ago by Wullschlaegel and March at intermediate localities show that this species is widespread in Jamaica, but so far it is not known from any other island.

Pilea Weddellii. *Suffrutex* monoica, caule adscendente, simplici vel ramoso, glabro. *Folia* ejusdem paris inæqualia elliptica vel anguste elliptica, breviter vel longe acuminata, acuta, basi emarginata, integerrima, trinervia, utrinque glabra vel supra sparse pilosa, nervis infra pubescentibus, margine glabro vel sparse ciliato; cystolithis in pagina superiore minutis, prominentibus, conspicuis, inferiore minutis, inconspicuis inspersa. *Stipulæ* deciduæ, breves, lunares. *Cymæ* paniculatæ, androgynæ, pedunculo petiolo breviore interdum paullo longiore. *P. ciliaris* var. *Rivoriæ* Wedd. in DC. Prodr. xvi. pt. 1, 114 (1869) (in part). *P. Parietaria* Griseb. Fl. Br. W. Ind. 156 (excl. syn. *P. Rivoriæ*). Types in Herb. Mus. Brit., in Herb. Kew., and in Herb. Jam.

Stem to 9 dm. high. *Leaves* 1·5–7·5 cm. l., 1–2·5 cm. br., venation on under surface conspicuous. *Stipules* ·5–1 mm. l. *Cymes* 1 or 2 in axils. *Male bud* ·75 mm. l., globose-pyriform; segments with a raised median line ending in connivent tubercles. *Achene* ·75 mm. l., roundish-elliptical or roundish-ovate, margined, muriculate, projecting beyond median perianth-segment by one-quarter to one-third; median segment as long as the achene, oblong-elliptical with a light-coloured dorsal keel; lateral segments elliptical, shortly acute, half to one-third as long as the median.

Hab.—*Wright*! *Masson*! *Swartz*! *Bancroft*! Bath, *Purdie*! *Wilson*! Blue Mts., *Alexander*! J. P. 1147, *Morris*! Portland Gap, 5500 ft.; near Morse's Gap, 4800 ft., *Harris*! 5426, 7351.

There has been some confusion as to the species *P. Parietaria* and *P. ciliaris*, owing in part to want of knowledge of Sloane's specimen on which Linnæus founded *Urtica Parietaria*. *P. ciliaris* Wedd. does not occur in Jamaica; the var. *Rivoriæ* includes a Martinique species (formerly described by Weddell as *P. Rivoriæ*) and a distinct species from Jamaica which we describe as *P. Weddellii*.

Pilea rufescens. *Suffrutex* monoica, caulibus ramosis, adscendentibus, ramis hirsutis. *Folia* ejusdem paris inæqualia, majora petiolata, elliptica, alia multo minora, subsessilia, rotundata, triplinervia, in dimidia parte superiore serrata, supra glabra, marginibus nervisque subtus hirsutis, pilis rufescentibus. *Stipulæ* rotundatæ, persistentes. *Cymæ* androgynæ, umbellatæ vel corymbosæ, pedunculo petiolo multo longiore. Types in Herb. Mus. Brit. and in Herb. Jam.

Stem 2–3 dm. high. *Leaves*, larger 1–2·2 cm. l., ·6–1 cm. br., smaller ·5–1 cm. l.; basal nerves reaching about the upper third of the leaf; cystoliths linear-fusiform, conspicuous on upper surface, smaller and much more numerous beneath; petioles ·4–1 cm. l., hirsute with brownish hairs. *Stipules* 3–4 mm. l., glabrous, ferruginous (when dry). *Cymes* small, peduncle about ·5 cm. l. *Male flowers* white; perianth ·7 mm. l., dorsal appendage small, tuberculate, patent. *Achene* 1·1 mm. l., elliptical, not margined, minutely spotted, projecting beyond the median segment by half its length; median segment ·75 mm. l.; lateral segments slightly shorter than the median, elliptical, obtuse.

Hab.—On limestone rocks; near Troy, 2000 ft., *Harris*! 8533.

Near *P. rufa* Wedd., but differs in being less hirsute; leaves apparently tougher, not serrate so far down, and with much more obvious cystoliths; inflorescence with few flowers, not paniculate; perianth-segments of the female flower subequal.

Pilea oblanceolata. *Herba* dioica (?) (floribus femineis tantum visis), glabra, caulibus decumbentibus vel ascendentibus, simplicibus. *Folia* ejusdem paris magis minusve æqualia, oblanceolata, acuta vel breviter acuminata, basi longe attenuata, 3–6 cm. l., apice serrata, triplinervia, membranacea, cystolithis supra linearibus, infra obsoletis, minutis inspersa. *Cymæ* femineæ paniculatæ densifloræ, pedunculis petiolis longioribus. Type in Herb. N. York Bot. Gard.

Stems 10–30 cm. l., rooting below at the nodes, and between the nodes, when dry, more or less compressed, 1·5–3 mm. br., with very short linear cystoliths only seen on young shoots; internodes very variable in length, 1–4 cm. l. *Leaves* 1·8–1 cm. br., with the two lateral nerves produced to about three-fourths of their length; petioles ·3–1 cm. l. *Cymes* solitary from axils of upper leaves; peduncles 3–4 cm. l. *Female flowers* sessile or subsessile. *Achene* 1 mm. l., broadly ovate, muriculate; median segment of perianth 1·2 mm. l., with tuberculate dorsal appendage; lateral segment two-thirds as long as median.

Hab.—In crevices of rocks; Peckham Woods, Upper Clarendon, 2500 ft., *Harris*! 10,946.

This species is near *P. crassifolia* Bl. and *P. reticulata* Wedd., but is easily distinguished from both by the form of the leaves.

Pilea Elizabethæ. *Suffrutex* dioica (mascula tantum visa), glabra. *Folia* ovata acuminata basi obtusa vel rotundata crenato-serrata. *Stipulæ* ellipticæ deciduæ. *Cymæ* dense multifloræ paniculatæ. *Perianthii* masculi appendices patentes. Types in N. York Bot. Gard. and in Herb. Jam.

Leaves 1 dm. l. or less, 3–6 cm. br., nerves produced nearly to the apex, with numerous dark sunken glands on lower face following the course of the veins; margin less coarsely serrate than in *P. grandifolia*; cystoliths on upper surface very unequal, fusiform or punctiform, beneath subequal, linear, smaller and more frequent. *Stipules* 1 cm. l. *Cymes* (including peduncle) shorter than the leaves, 2·5–6 cm. l. *Male perianth* globose, 1·2 mm. l., with patent thick appendages, ·2 mm. l.

Hab.—Hills near Bullstrode, March, *Mrs. E. G. Britton*, 2876!

This species resembles *P. grandifolia* L., but is smaller with ovate leaves, smaller deciduous stipules, and differs also in the character of the inflorescence and in the male flower.

The specific name is given in honour of the collector, Mrs. Elizabeth G. Britton, the well-known American bryologist.

This species is very near *P. grandifolia* Bl., but the male flowers differ, and the leaves are smaller and ovate.

Pilea appendicilata. *Suffrutex* monoica, caule simplici, erecto, glabro. *Folia* ejusdem paris magis minusve inæqualia, petiolata, ovata, acuminata, cordata, crenato-serrata dentibus magnis, trinervia, supra glabra, subtus pilosa præcipue in nervis, membranacea. *Stipulæ* magnæ, obtuse et late ovatæ, deciduæ. *Cymæ*, masculæ capitulis pluribus densifloris pedunculo longo; fœmineæ multo breviores in eadem axilla. *Perianthii* masculi appendices lati. Type in Herb. Jam.

Stem to 1 m. high. *Leaves* 7–12 cm. l., 5–7 cm. br., basal nerves produced nearly to apex; cystoliths on upper surface numerous, linear, smaller beneath; petioles 2–5 cm. l.; stipules 1 cm. l. *Male cymes*, peduncle to 7 cm. l., glabrous; flower-heads white, each 6–8 mm. in diam.; perianth (with appendages) about 2 mm. l., with pedicel of equal length, ellipsoidal-globose, segments coherent below, dorsal appendages roundish-elliptical about half the length of the perianth. *Female cymes*, peduncle to 1 cm. l., glabrous; flowers ·5 mm. l., sessile and subsessile; perianth-segments subequal and coherent in the greater part of their length.

Hab. — In shady places near river; Leicesterfield, Upper Clarendon, 1800 ft., Feb., *Harris*! 10,843.

This species at first sight might be regarded as a variety of *P. grandifolia* Bl., but the male flowers, even without the use of a lens, are evidently quite different.

Specific name from the broad appendage of the male perianth-segments.

Pilea troyensis. *Herba* monoica, caulibus repentibus, puberulis. *Folia* ejusdem paris magis minusve inæqualia, late ovata aut sæpe rotundata, ultra trientem inferiorem crenato-serrata, vel interdum fere integerrima, trinervia, utrinque pellucidis pilis sparsis induta, infra nervis strigilloso-puberula, membranacea; cystolithi lineares, infra minores. *Stipulæ* brevissimæ, rotundatæ. *Cymæ* paniculatæ, pedunculis petiolis longioribus, glomerulis aggregatis, flore masculo inter femineos singulo. Type in Herb. N. York Bot. Gard.

Hab.—Rocky wooded hill, Troy, *Britton*, 708!

Leaves ·5–1 cm. l., ·5–·9 cm. br., with the two lateral nerves produced to one-half or three-fourths of their length; petioles 1–2·5 mm. l. *Stipules* about ·5 mm. l. *Peduncles* glabrescent, 5–7 mm. l. *Male flowers* subsessile; perianth globulose, with a few pellucid hairs, about ·5 mm. l.; dorsal appendages, those of a pair equal, one pair bluntly and shortly triangular, the other linear, blunt. *Female flower* about ·5 mm. l., larger segment ·4 mm. l., the lateral about half the length. *Achene* (unripe) white with orange-red stigma, about ·5 mm. l.

This species is very near *P. Harrisii* Urban (*Symbolæ Antillanæ*, i. 299), but differs in the flowers.

Pilea lamiifolia. *Herba* monoica, caulibus simplicibus, debilibus in parte inferiore decumbentibus et radicantibus dein adscendentibus, pubescentibus, ramulis junioribus hirsutis. *Folia* ejusdem paris magis minusve inæqualia, petiolata, ovata vel elliptico-ovata, basi obtusa rotundatave, ultra trientem inferiorem grosse serrato-crenata, trinervia, supra sparse pilosa, subtus in nervis pubescentia, membranacea. *Stipulæ* semilunares. *Cymæ* in apice pedunculi filiformis petiolo longioris aut brevioris, dense aggregatæ. Type in Herb. N. York Bot. Gard. and in Herb. Mus. Brit.

Stem 6–8 cm. l., sometimes rooting below at the nodes, densely covered with thin linear cystoliths; internodes 1–3 cm. l. *Leaves* 3–1 cm. l., 1·5–·8 cm. br., basal nerves produced to one-half to two-thirds of their length, not visible on upper surface, connected reticulately beneath; cystoliths small, linear, numerous on upper surface; petioles 2–8 mm. l. *Stipules* ·6–·8 mm. l. *Cymes* solitary from axils of upper leaves, peduncles glabrous. *Male flowers* sessile or subsessile; perianth about 1 mm. l., globose, segments coherent below, sparsely hirsute, dorsal appendages triangular. *Female flowers* pedicellate. *Achene* ·6 mm. l.; median segment reaching to about one-half of achene, ·4 mm. l., oblong, truncate, dorsal appendage mucronate; lateral segments half as long as median, ovate, acute.

Hab.—Woodlands, near Newport, Manchester, Sept., *Britton*, 3205!

This species is very near *P. diffusa* Wedd., but the flowers are different, as well as the indumentum of the leaves.

Pilea Hollickii. *Herba* dioica, caulibus simplicibus vel subramosis, adscendentibus, pubescentibus, infra nudis, apice foliatis. *Folia* ejusdem paris magis minusve inæqualia, elliptico-ovata, basi obtusa, ultra trientem inferiorem crenato-serrata, trinervia, supra glabra, subtus in nervis venisque pubescentia, membranacea. *Stipulæ* late ovatæ, amplexicaules. *Cymæ* (masculæ tantum visæ) in apice pedunculi petiolo longioris aggregatæ, rarius subsessiles. Types in Herb. N. York Bot. Gard., in Herb. Mus. Brit., and in Herb. Jam.

Stem 10–20 cm. high, about 2 mm. br., covered with thin linear cystoliths; lower internodes sometimes very long (to 9 cm. l.). *Leaves* 9–17 mm. l., 7–12 mm. br., basal nerves produced to about two-thirds of their length, glandular-dotted below; deciduous except at apex where 4–6 are crowded together; cystoliths linear, small on upper surface; petioles pubescent, 3–7 mm. l.; stipules 2–3 mm. l. *Cymes* in the axils of the upper leaves, peduncles glabrous, generally 5–17 mm. l. *Male flowers* sessile or subsessile; perianth 1·6–1·7 mm. l.; segments coherent to about level of dorsal appendage, outline (incl. appendage) broadly ovate; appendages, opposite pairs of unequal length, triangular, nearly as long as the rest of the perianth.

Hab.—Union Hill, near Moneague, April, *Britton & Hollick*, 2754!

The leaves suggest a small variety of *P. obtusata* Liebm., but the cymes are short with dense-flowered clusters at the apex of the peduncles.

Pilea silvicola. *Herba* dioica, infra suffrutescens, caulibus ascendentibus simplicibus v. paullo ramosis, glabris. *Folia* ejusdem paris magis minusve inæqualia, petiolata, elliptico-ovata, breviter subacuminata, basi subcordata, ultra trientem vel dimidium inferiorem grossiuscule serrata, trinervia, plantæ masculæ glabra, femineæ utrinque sparse pilosa, membranacea. *Stipulæ* ellipticæ amplexicaules. *Cymæ* paniculatæ, pedunculo petiolum longe superante. Type in Herb. N. York Bot. Gard.

Stem 20–30 cm. l., 2–3 mm. br., sometimes rooting below at the nodes, densely covered with short broadly linear cystoliths; internodes 1·5–3 cm. l. *Leaves* 5–3 cm. l., 3–1·5 cm. br., basal nerves produced to about three-fourths of their length, the others not visible on upper surface, connected reticulately beneath; cystoliths on upper surface linear, beneath thinner and smaller; petioles 8–22 mm. l.; stipules 5–6 mm. l. *Male cymes*, clusters dense-flowered, peduncle 1–1·5 cm. l., flowers subsessile or with pedicels to 1 mm. l.; perianth 1·25 mm. l., coherent at base, segments ovate, with a long acuminate dorsal appendage about one-half their length; anthers barely ·3 mm. l. *Female cymes*, clusters few-flowered, peduncle 2·5–3 cm. l., flowers sessile or subsessile with pedicels to ·3 mm. l.; median perianth-segment about ·6 mm. l., dorsal appendage short, subconical, about on a level with apex; lateral half as long, broadly elliptical.

Hab.—In crevices of rocks, Peckham Woods, Upper Clarendon, 2500 ft., July, *Harris*! 10,948.

This species comes also near to the group of species which includes *P. obtusata* Liebm. and *P. diffusa* Wedd., but it differs in the flowers and also in the leaves.

Explanation of Plate 518.

Fig. 1. *Pilea oblanceolata*, natural size. 2. *P. Weddellii*, *a*, male flower; *b*, *c*, *d*, *e*, female flower in various stages; *f*, fruit; *g*, perianth with staminodes (*p*, perianth; *s*, staminodes) after escape of fruit; *h*, cystoliths on portion of upper part of leaf. 3. *P. rufescens*, *a*, male flower; *b*, fruit; *c*, cystoliths on portion of upper surface of leaf. 4. *P. oblanceolata*, *a*, *b*, female flower in different stages; *c*, fruit with perianth and staminodes folded in (*s*, staminodes); *d*, perianth and staminodes opened out (*s*, staminodes); *e*, cystoliths on portion of upper surface of leaf. 5. *P. Elizabethæ*, *a*, male flower; *b*, cystoliths on portion of upper surface of leaf. 6. *P. appendicilata*, *a*, male flower; *b*, female flower; *c*, cystoliths on portion of upper surface of leaf. 7. *P. troyensis*, *a*, male flower; *b*, fruit; *c*, cystoliths on portion of upper surface of leaf. 8. *P. lamiifolia*, *a*, male flower; *b*, fruit; *c*, cystoliths on portion of upper surface of leaf. 9. *P. Hollickii*, *a*, male flower; *b*, cystoliths on portion of upper surface of leaf. 10. *P. silvicola*, *a*, male flower; *b*, cystoliths on portion of upper surface of leaf.

Figs. 2–10 all × 10, except fig. 2, *b*, *c*, *d*, and 4, *a*, which are × 20. The fruit is in each case surrounded by the persistent perianth. The hairs on leaf-surface, where they occur, are not indicated.

LANCASHIRE ASCOMYCETES.

By Harold J. Wheldon.

Mycology has received but little attention in Lancashire from the older botanists, and local floras and lists contain very meagre records or none at all, and such as are given refer almost exclusively to the larger species.

In investigating the fungus flora of West Lancashire, having undertaken to prepare an account of the fungi of the adjacent vice-county for the South Lancashire Flora Committee of the Liverpool Botanical Society, the writer has searched through local literature for the purpose of collating published records, but only one or two brief lists have been found, and these relate to South Lancashire only.

Probably the first and only list containing Ascomycetes is that given in *The Manchester Flora* by Leo H. Grindon (1859), but no definite localities are quoted for some of the species named, and these cannot be included, as it is doubtful whether they occurred in Lancashire or Cheshire, and some of those for which stations are indicated have been excluded, it being uncertain to which modern species the author referred. A few solitary records and notes have been gleaned from more recent publications, and these are quoted under the respective species mentioned.

Hence the following list consists for the greater part of the results of recent investigation, extending over the past two or three years only, and confined to limited portions of both vice-counties. Consequently this must be regarded as an introduction to the flora, not indicating in any degree the distribution or relative frequency of the species named, nor as being even approximately complete. It may not be out of place to mention here that the Basidiomycetes and other groups of fungi are also receiving attention.

The results so far obtained indicate the probability of further discoveries of interest, and are published with the hope of stimulating, if possible, greater activity in this direction among local botanists, so that a fairly representative list of fungi may be compiled for inclusion in the projected Flora of South Lancashire, and a more complete knowledge gained of the species occurring in the adjacent vice-county.

For the arrangement and nomenclature of the Pyrenomycetes, I have followed Saccardo's *Sylloge Fungorum*, and the identifications have been made chiefly with the aid of the descriptions in this work supplemented by A. N. Berlese's fine companion work *Icones Fungorum.*

The numbers preceding localities refer to the Watsonian vice-comital divisions, *viz.* 59 South Lancashire and 60 West Lancashire, the dividing line of which is the River Ribble.

I am indebted to Dr. J. W. Ellis, of Liverpool, and Mr. H. Murray, of Manchester, for various records of interest. For forwarding specimens my thanks are due to those gentlemen whose names appear in the list, and also to Messrs. J. W. Hartley (Carnforth), G. H. Hopley (Brinscall), W. G. Travis (Liverpool), Albert Wilson, F.L.S. (Ilkley), and J. A. Wheldon, F.L.S. (Liverpool). The initials following localities refer to these contributors except "C. C., &c.," which denotes that the specimen was collected on an excursion in the company of Mr. Crossland and some members of the Liverpool Botanical Society. Where no authority is quoted, the responsibility rests with the writer alone, or jointly with Mr. J. A. Wheldon.

I especially desire to accord my thanks to Mr. Charles Crossland, F.L.S., of Halifax, and Mons. Boudier, for assistance with some critical Discomycetes, of which group they have made special study.

PYRENOMYCETES.

PERISPORIACEÆ.

Podosphæra oxyacantha De Bary. 59. Amphigenous on leaves of hawthorn. Langho and near Kirkby, July, 1909, *J. A. W.*

Sphærotheca pannosa (Wallr.) Lév. 59. On garden roses, Walton, June, 1909, *Wh.*; on *Rosa arvensis* and garden roses at Davyhulme, Urmston, and Flixton, *H. Murray*.

Phyllactinia suffulta (Reb.) Sacc. 60. On almost every young oak at Wennington, *Wh.*; Wray, and in Roeburndale, August, 1910, *J. W. H. & H. J. W.*

Erysiphe communis (Wallr.) Fr. 59. Common, Aintree, Ormskirk, Ford, &c. 60. On *Polygonum aviculare*, Morecambe, *J. A. W.*; on *P. Roberti*, Fleetwood, *J. A. W.*

E. graminis DC. 59. On grass (*Bromus*), Aintree, May, 1911. 60. Gressingham, August, 1910.

E. cichoracearum DC. 59. On *Arctium Lappa*, &c., Maghull.

Eurotium herbariorum (Wigg.) Link. 59. On pileus of an old Agaric, Walton, June, 1909; near Manchester, 1859, *L. H. Grindon.*

Thielavia basicola Zopf. 59. First conidial stage on peas, Walton, June, 1909.

SPHÆRIACEÆ.

Valsa nivea (Pers.). 60. On twigs of *Populus*, Bay Horse, April, 1911.

V. leucostoma (Pers.). 60. On *Pyrus aucuparia* near Tarnbrook, April, 1911.

Eutypella padi (Karst.) Sacc. 60. On *Prunus Padus*, Leck, August, 1910.

Eutypa lata Tul. Forming a thin crust on wood and branches. 59. Rivington, February, 1911; Town Green, near Ormskirk; on elm, Flixton, *H. Murray*. 60. Leck, August, 1910; Arkholme and Gressingham; Silverdale, 1909; Caton, 1910; Tarnbrook, April, 1911; Brock, 1910.

Diatrype disciformis (Hoffm.) Fr. 60. On branches, Grisedale, near Abbeystead, April, 1911.

D. stigma Fr. 59. Melling; Rainford; Rivington, February, 1911, *G. H. H. & H. J. W.*; Flixton, *H. Murray*. 60. Hornby and Gressingham, August, 1910; Silverdale; Carnforth, *J. W. H. & H. J. W.*; Caton, March, 1910, and Wreay; Brock; Abbeystead, April, 1911.

Diatrypella verrucæformis (Ehrh.) Nits. 60. Fallen branch, Silverdale, August, 1909; Caton, March, 1910.

D. quercina (Pers.) Nits. 60. Near Abbeystead, April, 1911.

Chætomium comatum (Tode) Fr. 60. On furze (*Ulex Gallii*) near Abbeystead, April, 1911.

Sordaria coprophila (Fr.) Ces. et De Not. 60. On cow-dung, Wennington, August, 1910; Tarnbrook, April, 1911.

S. bombardioides Auersw. 60. On cow-dung, Grisedale

Moor, near Abbeystead, April, 1911. The specimens referred to agree very well with Saccardo's description of this species, but I have not access to authenticated examples for comparison. The original fungus was found in Germany on hare-dung, and Rehm has recorded it on horse-dung from California. The spores of the German example are stated to be 22–25 × 12–14 μ, whilst those of the Californian species are 25 × 9 μ. As the fungus seems to be new to the British flora the following description of the West Lancashire specimens may be of interest:—Perithecia immersed, sparsely gregarious to subcæspitose, shape variable, almost cylindrical, oblong, pyriform or utriculiform, about 0·75 mm. high, rough, the rounded apex having a few setulose papillæ near the ostiole as in *S. minuta* Fck., brownish black. Asci cylindrical, 142–165 × 15–18 μ, 8-spored. Spores uniseriate, ovate-elliptical, first hyaline but soon fuscous-black, with two or more oily nuclei, 23–25 × 12–14 μ (excluding the hyaline appendages, which are about 10 μ long).

Hypocopra fimicola (Rob.) Sacc. 60. On cow-dung near Tunstall and Wennington, August, 1910.

Rosellinia pulveracea (Ehrh.) Fck. 60. Wray, August, 1910, *J. W. H. & H. J. W.*

R. conglobata (Fr. et Fck.) Sacc. 60. On furze, Abbeystead, April.

R. quercina Hartig. 59. On oak seedlings, Nurseries, Brinscall, July, 1909. Received from Mr. McBeath, per G. H. Hopley.

R. aquila (Fr.) De Not. 60. Lords Lot Wood, near Arkholme, August, 1910.

Bombardia fasciculata Fr. 59. As *Sphæria Bombarda*, Hough End Clough, *L. H. Grindon*, 1859.

Xylaria hypoxylon (Linn.) Grev. Common on stumps. Recorded for every division of both vice-counties.

Ustulina vulgaris Tul. 60. On beech-branch, near Dolphinholme, April, 1911.

Hypoxylon fuscum (Pers.) Fr. 59. Whalley, June, 1910, *J. A. W.*; Chorley; Ince Woods. 60. Tunstall and Leck, August, 1910; Silverdale, *Wi. & Wh.*; on hazel, Castlebarrow, March, 1910; Dolphinholme, April, 1911.

H. multiforme Fr. 59. Hough End Clough, 1859, *L. H. Grindon* (*Flora of Manchester*). 60. On alder, Abbeystead, April, 1911.

Daldinia concentrica (Bolt.) Ces. et De Not. 59. On ash, Ince Woods, 1909; on trunk, Rainford. 60. Deep Dale, Yealand, August, 1910, *J. W. H.*; Carnforth, 1910, *J. W. H.*

Nummularia succenturiata (Tode) Nits. 60. On oak (?) wood, Wray, August, 1910.

Gnomoniella tubiformis (Tode) Sacc. (Syn. *Cerastoma tubæformis* Ces. et De N.). 60. On leaves of *Alnus glutinosa*, near Abbeystead Lake, April, 1911.

Læstadia punctoidea (Cke.) Auersw. 60. On fallen oak-leaves, Bay Horse and Tarnbrook, April, 1911.

Sphærella tyrolensis Auersw. 60. On dead fronds of *Polypodium vulgare* near Bay Horse.

S. maculiformis (Pers.) Auersw. 60. On fallen oak-leaves, hypophyllous, Dolphinholme, April, 1911; on *Vaccinium*, Great Clough, Tarnbrook Fell.

S. macularis (Fr.) Auersw. 60. Amphigenous on leaves of *Populus tremula*, Abbeystead, April, 1911.

S. hedericola (Desm.) Cke. 60. Ivy-leaves, Dolphinholme.

S. Vaccinii Cke. (syn. *S. Myrtillis* Auersw., *S. maculiformis* Fr.). 60. Forming hypophyllous spots on *Vaccinium Myrtillus*, Tarnbrook Fell.

S. rumicis Cke. On leaves of *Rumex*. 59. Melling, 1909. 60. Wennington.

Gnomonia cerastis (Riess.) Auersw. (*Sphæria petioli* Fck.). On petioles of fallen sycamore-leaves. 60. Lower Emmetts and Abbeystead, Over Wyresdale. Spore measurements, 16–17 × 3·3–4 μ. (Sacc. 17 × 4 μ.)

G. setacea (Pers.) Ces. et De Not. On petioles of fallen sycamores. 59. Lathom Park, May, 1911. This species and the preceding are superficially very similar, but the shape of the asci and the size and arrangement of the spores are quite distinct.

Ticothecium pygmæum Koerb. var. *ventosicola* Wint. 60. On the thallus of *Lecanora ventosa*, Lower Ease Gill, May, 1904, *A. W. & J. A. W.*

Melanconis alni Tul. On branches of alder, Dolphinholme.

Diaporthe (*Chorostate*) *Cratægi* (Curr.) Fck. 59. On hawthorn, Aintree, 1910.

D. (*Euporthe*) *samaricola* Phil. & Plow. 60. On fallen ash samaras, Lower Emmetts.

D. (*Eu.*) *pulla* Nits. 60. On ivy-twigs, Hole of Ellel Bridge, Bay Horse, May, 1911.

Clypeosphæria Notarisii Fuck. 60. On twigs, Abbeystead, Dolphinholme.

Leptosphæria acuta Karst. (*Heptameria* Cke.). Common on nettle-stems. 59. Brinscall, Aintree, Little Crosby, *J. W. E.*; Lathom, &c. 60. Wennington, Gressingham, Caton, Lower Emmetts; Wray, *J. W. H. & H. J. W.*; Brock Valley.

L. acutiuscula Sacc. 60. On stems of *Urtica dioica*, Lower Emmetts.

Chætomastia canescens (Speg.) Berl. 60. Melling, near Wennington. Not having seen this recorded previously for Britain, I give the following short description:—Perithecia superficial, pilose, gregarious, black, $\frac{1}{4}$–$\frac{1}{3}$ mm. Asci cylindrical, 80 × 15–17·5 μ, 8-spored. Spores uniseriate, 3-septate, pale brown, concolorous. On the cut end of fallen rotten post. Melling, near Wennington.

Melanomma pulvis-pyrius Fck. On cut ends of branches, &c. 59. Chatburn, May, 1910, *W. G. T.*; Brinscall, *G. H. Hopley & H. J. W.*; Ormskirk and Lathom. 60. Noted from every division except divisions 4 and 5.

Lasiosphæria spermoides Ces. et De Not. (*Psilosphæria* Cke.).

On cut ends of trunks, &c. 59. Brinscall, *G. H. Hopley & H. J. W.* 60. Ease Gill, *J. W. H. & H. J. W.*; Caton and Brock.

L. hispida Fck. 60. On wood, Leck and Wray, August, 1910.

Zignœlla seriata (Curr.) Sacc. 60. On bare wood, Hornby, August, 1910.

Z. ovoidea Fries. 60. On hazel branches, Lower Emmetts, Over Wyresdale, April, 1911.

Z. collabens (Curr.) Sacc. 60. On bare wood, Wray, August, 1910.

Z. ostioloidea. 60. On a stroma of *Diatrypella quercina*, Grisedale, near Abbeystead, April, 1911.

Pleospora herbarum Rabh. 60. Roeburndale, August, 1910, *J. W. H. & H. J. W.*; Lower Emmetts, Over Wyresdale, on *Centaurea nigra.* 59. Rivington, 1911.

P. vulgaris Niessl. 60. With the preceding on *Centaurea*, Over Wyresdale.

Cucurbitaria conglobata (Fr.) Ces. et De Not. 60. On *Corylus*, Wray, August, 1910.

C. elongata (Fr.) Grev. 60. Grisedale, near Abbeystead, April, 1911.

Ophiobolus vulgare Sacc. 60. On stems, Wennington and Lower Emmetts, Over Wyresdale.

O. cesatianus (Mont.). 60. On *Carduus* stems, near Tarnbrook.

O. Cirsii (Karst). 59. On *Carduus palustris* in swamp behind Walton Junction Station, Liverpool, May, 1911.

Acerbia bacillata Sacc. 60. On wood, Wray, August, 1910.

HYPOCREACEÆ.

Hypomyces chrysospermus Tul. Common on decaying fungi, more especially in the conidial stage (*Sepedonima chrysospermum* (Bull.) Link.). Recorded for every division in both vice-counties.

H. aurantius (Pers.) Fck. 60. On *Polystictus versicolor*, Leck, Wennington and Silverdale.

Nectria cinnabarina (Tode) Fr. Common in both vice-counties.

N. coccinea (Pers.) Fr. 59. On bark of fallen tree, Fazakerley, near Liverpool, 1910. 60. Lower Emmetts, April, 1911.

N. ditissima Tul. 59. On fruit-tree, Leyland, 1910, *Rev. C. E. Fynes-Clinton.*

N. Peziza (Tode) Fr. 59. On decaying tree-stump, Flixton, 1908, *H. Murray.*

N. episphæria (Tode) Fr. On *Diatrype stigma.* 60. Warton Crag. 59. Longton, December, 1911.

Hypocrea rufa (Pers.) Fr. Common throughout both vice-counties, especially in the conidial stage (= *Trichoderma viride*) on wood. Dr. J. W. Ellis has sent me specimens growing on a dead corky fungus from near Warrington (v.-c. 59), July, 1909.

Claviceps purpurea (Fr.) Tul. 59. On *Lolium perenne*, Hough End, 1859, *L. Grindon* (*Flora of Manchester*); Flixton and Urmston, 1909, *H. M.*; on *Festuca elatior* at Speke, and on *Triticum junceum*, Churchtown, Southport, October, 1910, *W. G. T.*

Cordyceps militaris (Linn.) Link. On larva of Lepidoptera,

&c. 59. Heapy, near Chorley, July, 1909, *G. H. H.*; conidia (*Isaria farinosa*) stage at Lathom; Aintree, October, 1909, *W. G. T. & J. A. W.*; on *Crocallis cingularia*, Flixton, 1898, and on ichneumon pupa and larva at Urmston, December, 1909, *H. M.* 60. Bolton-le-Sands, October, 1908, *J. W. H.*; conidia stage at Wray.

Epichloe typhina (Pers.) Tul. 59. Meadow at Flixton, *H. M.* 60. Occasionally seen on the stems and leaf-sheaths of *Dactylis glomerata*, *Wi. & Wh.* (*Flora of West Lancashire*, p. 321).

DOTHIDEACEÆ.

Phyllachora Heraclei (Fr.) Fck. 60. On *Heracleum Sphondylium*, near Tarnbrook, Over Wyresdale.

P. graminis (Pers.) Fck. 60. On grass, Melling and Gressingham, August, 1910.

P. Junci (Fr.) Fck. 60. On *Juncus effusus*, Melling, August, 1910; and Grisedale, near Abbeystead, April, 1911.

P. pteridis (Reb.) Fck. 59. Whalley, May, 1910, *J. A. W.* 60. Nether Burrow and Caton, August, 1910.

Rhopographus filicinus (Fr.) Fck. The subinnate parallel stroma of this fungus have been observed on stems of *Pteris aquilina* in every locality in which the host-plant has been found. Many records for each vice-county.

HYSTERIACEÆ.

Glonium lineare (Fr.) De Not. (*Hysterium* Fr.). 60. On wood, Roeburndale, August, 1910, *J. W. H. & H. J. W.*

Hysterium pulicare Pers. 60. Arkholme, August, 1910.

H. angustatum Alb. & Schw. 60. On birch, Carnforth, August, 1910, *J. W. H. & H. J. W.*

Hysterographium fraxini (Pers.) De Not. 60. Caton, March, 1910.

Hypoderma virgultorum DC. 60. On *Rubus*, Dolphinholme, April, 1911, and near Leck, August, 1910.

H. conigenum (Pers.) Cke. On old fir-cones. 59. Lathom Park, May, 1911. 60. Plantation on Hare Appletree Fell, April, 1911; Caton, March, 1910.

Lophiodermium arundinaceum Chev. 59. On *Phalaris*, near Mere Brow, 1909, *J. A. W.* 60. Hawes Water, *J. A. W.*; Abbeystead Reservoir, April, 1911.

L. pinastri (Schrad.) Chev. 60. On fallen pine-needles, in plantation on Hare Appletree Fell.

L. juniperinum (Fr.) De Not. 60. Dead leaves of juniper, Warton Crag, 1910.

ONYGENACEÆ.

Onygena equina Pers. 60. On decaying sheep's horns on Tarnbrook Fell, April, 1911.

O. corvina Alb. et Schwein. 59. On beak and feathers of a bird in a swamp at Aintree, February, 1911.

DISCOMYCETES.

HELVELLACEÆ.

Morchella esculenta DC. 59. On the left bank of the Irwell, below Clifton Aqueduct, *James Percival, Junr.*, 1859. Sandhills hills at Freshfield.

Mitrophora semilibera Lév. 59. Hale, January, 1911, *W. G. T.*

Gyromitra esculenta (Pers) Fr. 59. On the sandhills at Formby, May, 1908, *W. G. T.*

Helvella corium (Web.) Mass. 59. Frequent on the sandy flats near the sea, from Formby to Ainsdale, September, 1909, and since annually. Mr. Crossland, who kindly determined these specimens, stated that Dr. Cooke's figure of these species is two to three times as big as the largest of our specimens, so that it must vary considerably in size, and that he does not figure the central globule in the spores. The Formby specimens were about 1–2·5 cm. high, closed and subglobose then becoming quite plane, the diameter then being from ·5–3 cm.; externally the ascophores are minutely verruculose, blackish with a bluish grey tinge; the stems are slightly swollen and paler below. Spores 8, hyaline 1-guttulate, continuous, broadly elliptical $20 \times 12\ \mu$. The first British specimens were found by Plowright at King's Lynn. Mons. Boudier, who confirmed the identification, refers it to the genus *Cyathipodia* as *C. corium* (Web.) Boud.

Geoglossum hirsutum Pers. 59. Birkdale, September, 1910, *H. M.*

G. glabrum Pers. 59. Mr. A. A. Dallman has sent specimens collected at Wavertree Quarry, Liverpool. (See *Proceedings of the Liverpool Botanical Society*, 1906.) 60. Lytham, November, 1898, *J. A. W.*

Mitrula cucullata (Batsch.) Fr. 59. On dead fir-leaves, Freshfield sandhills, October, 1909, *C. Crossland.*

PEZIZACEÆ.

Geopyxis coccinea (Scop.) Mass. 60. Near Over Kellet, *Wi. & Wh.*; Yealand, among moss, January, 1911. Collected by Mr. Threlfall.

Peziza vesciculosa Bull. Common on rich soil, dung heaps, &c. 59. Brinscall, *G. H. H.*; Walton, Aintree, and Garston. 60. Silverdale, August, 1909, and Brock, May, 1910.

P. ampliata Pers. 59. Among moss, and on the rotten wood of a fern-box, Aintree, May, 1909. Collected by Miss Dunning. Specimens appeared in the same place the following year.

P. repanda Wahl. 59. Wavertree, near Liverpool, 1910, *Miss Cook*; soil in fernery, Burnley, *C. R. Ritchings.*

P. pustulata Pers. 59. Lathom, on dry ground in a wood.

P. brunneo-atra Desm. (*Humaria macrospora* Mass. (*pro parte*)). 59. Occurs in company with *Helvella corium* on the sandy flats by the sea, from Formby to Ainsdale. Mons. Boudier, who has seen the specimens, states they are his *Galactinia brunneo-atra* (Desm.) Boud., which he keeps distinct from *G. macrospora* (Wall.) Boud.

Otidea aurantia Mass. 59. Rochdale, October, 1909. Sent by Mr. W. H. Western (see *Lancashire Naturalist*, vol. ii. p. 215); near Leyland. 60. Over Kellet, *Wi. & Wh.*; Carnforth, *J. W. H.* Occurring on paths, roadsides, &c.

Barlæa cinnabarina Sacc. 59. On sandy flats near the sea at Birkdale, Ainsdale, and Freshfield, where it appears annually.

Humaria convexula Quel. 60. Yealand, July, 1910, *J. A. W.*; Carnforth, *J. W. H.* On soil among moss.

H. granulata Sacc. Common on cow-dung. 59. Knowsley Park, September, 1909; Ormskirk; Leyland, July, 1910, sent by *Rev. C. Fynes-Clinton*; Blackrod, near Adlington. 60. Wennington and Nether Barrow, August, 1910, *Wh.*; Halton and Hornby; Carnforth; near Garstang, *A. Wilson.*

H. violacea Sacc. 59. On floor of greenhouse, Walton, June and October, 1910, teste *Mr. Crossland.*

H. salmonicolor Sacc. 59. Hundred End, north of Southport, on damp soil, May, 1909, *W. G. T. & J. A. W.*

Sepultaria arenicola. 59. Common on the sandy flats near the sea between Formby and Churchtown. This plant is easily detected, although buried, as it causes holes in sand which resemble those made by an umbrella.

Lachnea scutellata Gillet. Common on rotting trunks, wood, &c., especially in shady places. The bright red disc makes it very conspicuous. 59. On rotten trunk in a stream near Colne, *H. Robinson*; Town Green, Lathom. 60. On inner bark of old trunk, Hornby Castle, August, 1910.

L. fimbriata Quel. 59. On soil and rotten wood of fern box, Aintree, June, 1910. Collected by Miss Dunning, teste *Mr. Crossland.* In the *Yorkshire Fungus Flora* (p. 264) this plant is recorded as growing on dust adhering to the wall in a shop window area at Halifax, with a note that it was previously only known to occur in France.

L. hemisphærica Gillet. 59. On the ground in wood in Lathom Park.

Sphærospora trechispora Sacc. 59. This small and bright-red fungus occurs annually in fair quantity among the moss in the sandy flats on the coast between Formby and Southport, together with the following variety which, although similar in many respects, is quite distinct. 60. Wray, August, 1910. On clayey ground in a wood; among moss at Carnforth, October–November, 1910, *J. W. H.*

Var. *paludicola* Boud. 59. Occurs with the type between Formby and Southport. First observed July to October, 1908. For the identification of this interesting fungus I am indebted to Mr. Crossland, who, finding it did not quite agree with the description of any of the British *Sphærospora*, sent it to Mons. Boudier, who named it as above. As this variety appears to be new to Britain, the following short description from fresh specimens may be useful:—

Ascophores scattered sessile, subglobose becoming plane, ·5–·7 cm. diam., 1·5 mm. thick. Disc scarlet to blood-red, externally much paler, clothed with thick-walled, pointed aseptate or 1–2 septate hairs, reddish brown below, hyaline towards the point, and sometimes the reddish colouring is absent; 183–280 × 10–12 μ (fig. 2) asci cylindrical, the apex being rounded, 290–300 × 28–30 μ, shortly pedicellate, 8-spored (fig. 1). Spores hyaline, globose 26 μ diam., 1-seriate, epispore thick, smooth, then becoming finally covered with *prominent* globose warts, 3 μ diam., which sometimes become detached. Paraphyses yellowish red above, paler below, stout, septate, *often branched*, apex clavate, 8-12 μ thick, narrowing to 4–5 μ towards the base, turning blackish with iodine. Differs from the type in the larger and more prominently tuberculate spores, the branched paraphyses, and the shorter paler hairs.

Dasyscypha virginea Fck. Very common; often densely gregarious on dead stems, branches, twigs, &c., especially in moist shady places. 59. Lathom, Freshfield, Little Crosby, Rainford, Adlington. 60. Melling, August, 1910; Caton, April, 1910; Roeburndale, August, 1910, *J. W. H. & H. J. W.*; Brock, May, 1910; Castlebarrow, Hornby.

D. nivea Sacc. As common as the preceding, on dead wood. Found in all divisions of the county.

D. asterostoma Mass. 60. Herbaceous stems, Preston, May, 1910. Differs from the description in having the hairs sometimes granulate.

D. bicolor Fck. 60. On still-standing dead coppiced hazel, Castlebarrow, near Silverdale, March, 1910; Wennington, August, 1910; Caton, March, 1910.

D. leuconica Mass. 60. Ease Gill, June, 1908, *W. G. T.*

D. hyalina Mass. Frequent on decaying wood in shady places. 59. Lathom; Freshfield, March, 1909, *C. Crossland.* 60. Ease Gill, at 500 ft., August, 1910; Hornby.

D. calycina Fck. 59. On Scots pine at Rainford Colliery. Specimens were collected on the props in "roads" in the mine, at a depth of about 2000 ft., *Miss Dunning & H. J. W.*; near Brinscall. 60. Roeburndale at 500 ft., August, 1910, *J. W. H. & H. J. W.*; Calder Valley, near Garstang, November, 1910, *A. Wilson.*

D. subtilissima Sacc. 59. In crevices of bark of Larch and Scots pine at Rainford, May, 1910.

D. dematiicola Mass. 60. On fallen twigs, Brock Bottom, May, 1910.

Tapesia fusca Fck. 60. On dead twigs, Roeburndale, August, 1910.

T. aurelia Phil. 60. On oak debris, Roeburndale, 1910.

Chlorosplenum æruginosum De Not. 60. Dry foss, East Gill, at 900 ft., *J. W. H. & Wh.*

Cyathicula coronata De Not. 59. On dead stems of nettle, Melling, 1911.

Helotium aureum Pers. 60. On fallen twigs, Carnforth and Roeburndale, August, 1910, *J. W. H. & Wh.*; Caton.

H. lutescens Fr. 59. Formby, December, 1908, *A. A. Dallman.*

H. uliginosum Fr. 59. Freshfield, December, 1908, *W. G. T.*

H. sublenticulare Fr. 59. On twigs in watery place in wood near Bispham, October, 1908.

H. cyathoideum Karst. 59. Lathom and Ince Blundell. 60. Common on decaying stems in damp places, Silverdale, Wray, &c.

H. gramineum Phil. 60. Near Wray, August, 1910.

H. scutula Karst. 60. Calder Valley, near Garstang, November, 1910, *A. Wilson.*

Belonidium pruinosum Mass. 59. Freshfield, October, 1909, *C. Crossland*, &c. 60. Brock, August, 1910.

Mollisia cinerea Karst. Found in every division in numerous localities in both vice-counties, on dead wood and branches.

M. lignicola Phil. 60. Wray, August, 1910, *J. W. H. & H. J. W.*

M. atrocinerea (Cke.) Phil. 60. Brock, May, 1910; Leck, August, 1910. 59. Longton, December, 1911.

M. atrata Karst. 60. Dead herbaceous stems, Lower Emmetts, Wyresdale, 1911, *Wh.*

M. fallax Gillet. 59. On coniferous branches, Freshfield, October, 1909, *C. Crossland*, &c.

M. filicinum Phil. 59. On *Lastræa Filix-mas*, Walton, 1910.

Pseudopeziza benesueda Mass. 60. On alder, Ease Gill, August, 1910, *J. W. H. & H. J. W.*

P. discolor Mass. 60. Melling, August, 1910.

ASCOBOLACEÆ.

Ascophanus carneus Boud. 59. On rabbit-dung, Hightown and Formby, 1907, *J. A. W.*

A. equinus Mass. 59. Cow-dung, Whalley, June, 1908, *J. A. W.*; on rabbit-dung, Formby, 1909. Longton Marsh, December, 1911.

Ascobolus furfurascens Pers. Common in both vice-counties, on cow-dung.

BULGARIACEÆ.

Orbilia leucostigma Fr. 59. Hall Road, near Bootle, on damp sticks in a ditch, July, 1910, *W. G. T. & Wh.*

Calloria fusarioides Fr. 60. On dead stems of nettles, Silverdale, March, 1910. 59. Hoole, December, 1911.

Coryne sarcoides Tul. 59. Common in every division. 60. Wennington, Silverdale, and Brock.

C. urnalis Sacc. 59. Lathom, February, 1911. 60. Calder Valley, near Garstang, November, 1910, *A. Wilson.*

Bulgaria polymorpha Wetts. 59. West Derby, 1905, *A. A. Dallman*; Brinscall, Maghull, Town Green, &c. 60. On oak and beech, Carnforth, *J. W. H.*; Calder Valley, *A. Wilson*; Roeburndale, Brock, and Wyresdale.

PATELLARIACEÆ.

Heterosphæria patella Grev. 60. Melling, August, 1910; Lower Emmetts.

STICTIDEÆ.

Stictis radiata Pers. Near Manchester, *Brittain*, teste *Wm. Phillips.* (See *British Discomycetes*, p. 380.)

PHACIDIACEÆ.

Phacidium multivalve Kze. and Schmidt. 59. Aintree, Rivington, Ormskirk. 60. Silverdale, Abbeystead, Gressingham, and Wennington. Occurs on dead leaves of holly.

Trochila craterium Fr. 59. Rivington, March, 1911; Formby, June, 1910. 60. Wennington, August, 1910; Bay Horse, April, 1911. On dead ivy leaves.

T. ilicis Cronan. Common on fallen holly leaves. 59. Colne, 1910, *H. Robinson*; Lathom, 1910; Aintree, 1908; Brinscall, 1911. 60. Wennington, Arkholme, Silverdale, Caton, and Brock, 1910.

Rhytisma acerinum (Pers.). Very common throughout both vice-counties.

R. punctatum (Pers.). Much more local than the preceding; on leaves of sycamore. 60. Wennington, where it occurred plentifully on quite young seedlings, August, 1910; Arkholme Moor, *Wh.*; Silverdale; Roeburndale, *J. W. H. & H. J. W.*

R. salicinum (Pers.). 59. On leaves of *Salix repens* at Formby and Freshfield, 1908.

EXOASCACEÆ.

Exoascus turgidus Sadeb. (*Ascomyces* Phil.). 59. Simmonswood Moss, 1908; Ormskirk, 1910, *W. G. T. & Wh.* 60. Dolphinholme, April, 1911. Forming "witches brooms" on silver birch.

Taphrina aurea Fr. 59. Leaves of *Populus nigra* on the banks of the Mersey, Flixton, 1909, *H. M.*

PATRICK MATTHEW.

(1790–1874.)

By W. T. Calman, D.Sc., F.L.S.

Patrick Matthew is mentioned by most historians of the Evolution theory as one of those who anticipated Darwin and Wallace in enunciating the principle of Natural Selection. Darwin himself fully acknowledged Matthew's claim to priority, but beyond the references in the historical introduction to the *Origin of Species* and in Darwin's *Life and Letters*, very little is known about him, and his book on *Naval Timber and Arboriculture*, published in 1831, has perhaps hardly received the attention it deserves.

In a recent paper,* Prof. Walther May gives a critical study of Matthew's book. He points out that, though Wells and Prichard preceded Matthew in recognizing the principle of Natural Selection, they only discussed its application to the races of mankind, while Matthew dealt with it as a factor in the general evolution of organic nature.

By the kindness of Prof. May, I have been put in communication with Miss Euphemia Matthew, who has been good enough to furnish me with some biographical details regarding her father, supplementing, and in some points correcting, those given in Prof. May's article. The following are the chief facts thus ascertained :—

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* "Darwin und Patrick Matthew,' *Zoologische Annalen*, Bd. iv. Heft 3, 1911, pp. 280–295, with portrait.

Patrick Matthew was born on Oct. 20, 1790, at Rome, a farm held by his father, John Matthew, on the banks of the Tay near Scone Palace. His mother, Agnes Duncan, was related, though in what degree is not known, to the family of Admiral Duncan, the famous ancestor of the present Earl of Camperdown. From her he inherited the estate of Gourdiehill, near Errol, in the Carse of Gowrie. He was educated at Perth Academy and at the University of Edinburgh, but on his father's death he took over the management of Gourdiehill before attaining his twentieth year. In 1817 he married his cousin, Christian Nicoll. He travelled a good deal in France, Spain, and Germany, residing for some time in Hamburg and in Holstein, where he acquired some property. He died at Gourdiehill on June 8, 1874.

Matthew was a frequent contributor to local newspapers, as well as to the *Gardeners' Chronicle* and the *Mark Lane Express*, on social and political questions and on agricultural matters. Besides the book on *Naval Timber*, he published one in 1839 on *Emigration Fields*, and, in 1864, a political pamphlet on *Schleswig-Holstein.* It is on the title-page of the latter that he describes himself as "Solver of the problem of species" (see letter from Darwin to Hooker, October, 1865). It does not appear that he ever met Darwin, but they corresponded at intervals, and Miss Matthew has kindly allowed me to see three letters from Darwin to her father, in which Matthew's claim to priority is acknowledged in the most friendly way.

It is of interest to notice that some expressions used by Matthews, *e.g.* the reference to "population-preventive checks," on p. 247 of his *Naval Timber*, suggest that he, like Darwin and Wallace, had been reading Malthus's *Principles of Population.*

SOME LITTLE-KNOWN BRITISH BOTANISTS.

By James Britten, K.S.G., F.L.S., and G. S. Boulger, F.L.S.

(Concluded from p. 131.)

Maude, M. F. (fl. 1848). 'Scripture Natural History.'
Maxwell, E. (d. before 1839). Lieutenant, 11th Dragoons.
Meen, Margaret (fl. 1790). Botanical artist.
Meyrick, William (fl. 1755–94). Of Birmingham.
Middleton, W. (fl. 1812). Of Poppleton Lodge, Yorkshire.
Miller, William (fl. 1851). Of Belfast.
Millett, Charles (fl. 1834), M.D. Collected in China.
Milner, Mary (fl. 1848). Of Appleby.
Mitchell, James (fl. 1838), R.N. Described *Mentha crispa.*
Molloy, Mrs. (fl. 1840–55). Of W. Australia.

MONSON, Lady ANN (d. before 1819).
MOORE, OSWALD ALLEN (d. before 1863). Of York.
MORGAN, THOMAS OWEN (fl. 1848–69). Of Aberystwith.
MORRIS, RICHARD (fl. 1820–30). Landscape gardener.
MOSELEY, HARRIET (fl. 1836-67). Of Malvern. Botanical artist.
MOSELEY, WALTER M. (fl. 1792). Of Glashampton, Worcester.
MURE, — (fl. 1820), M.D. Of Ayrshire.
MURRAY, Lady CHARLOTTE (d. 1808). Of Athol House.
MURRAY, DENIS (fl. 1845). Of Cork. Gardener.
MURRAY, PETER (fl. 1802–40). Palæobotanist.

NICHOLSON, HENRY (fl. 1712), M.D., Prof. Bot., Dublin.
NOTON, B. (fl. 1834). Collected in Neilgherries.
NUTTALL, JOHN (d. 1849–50). Of Tithewer, Wicklow.

OGILBY, LESLIE (fl. 1845). Of Dublin.
OGILVIE, GEORGE (fl. 1780). Collected in Guinea.
ORDOYNO, THOMAS (fl. 1807). Nurseryman. Of Newark.
OWEN, F. W. (fl. 1824). Captain R.N. Collected in Africa.

PALMER, Rev. S. (fl. 1829). Of Chigwell, Essex.
PARKINSON, Miss or Mrs. J. W. K. (fl. 1833). Translator.
PATRICK, Rev. WILLIAM (fl. 1831).
PENNINGTON, — (fl. 1788). In Smith's 'Icones.'
PERKINS, E. E. (Mrs.) (fl. 1837). Of Chelsea.
PICKFORD, WILLIAM PERCIVAL (fl. 1798–1807). Of Edinburgh.
PIERARD, FRANCIS (fl. 1834). H.E.I.C.S.
PIGOTT, — (fl. 1798–1808). Algologist.
POPE, Mrs. CLARA MARIA (d. 1838). Flower-painter.
PORTER, GEORGE (fl. 1800–34). Of Penang.
POTTS, Miss E. (fl. 1839). Of Chester.
POTTS, JOHN (fl. 1842–52). Of Chihuahua, Mexico.
POWELL, Miss — (fl. 1820–68). Of Henbury, Gloucestershire.
POWER, THOMAS (fl. 1845), M.D. Of Cork.
PRATTEN, Mrs., *née* KNAPP.
PRENTICE, CHARLES.
PRITCHARD, STEPHEN F. (fl. 1836). Of St. Helena?
PUGHE.—Surgeon. Of Barmouth and Aberdovey.

RANADE, N. B. (d. 1897). Of Poona.
RASHLEIGH, WILLIAM (fl. 1809). Cornish algologist.
RATTRAY, JAMES (fl. 1835). Surgeon. Of Glasgow.
REEVES, Rev. JOHN WILLIAM (fl. 1843).
REID, ELIZA P. (fl. 1826). Of Windsor.
REID, FRANCIS A. (fl. 1852). Lieut.-Colonel. Of Madras.
RITSON, A. (fl. 1832). 'Spring Flowers.'
ROBERTS, Rev. ALEXANDER (fl. 1773). Of Jamaica.
ROBERTS, DAVID (fl. 1820). Surgeon. Of Melin-y-coed.
ROBERTS, JOHN (d. 1828). Of Bangor.
ROBERTS, RICHARD (d. before 1828). Of Melin-y-coed.
ROBERTSON, ARCHIBALD (fl. 1822), M.D. Of Edinburgh.
ROGERS, PATRICK KERR (fl. 1802), M.D. Of Philadelphia.

Royds, Sir John (fl. 1819). Puisne Judge, Bengal.
Russell, John (fl. 1845). Agriculturist ?

Samson, Thomas (d. 1862), A.L.S. Cryptogamist.
Sarel, Lieut.-Col. H. A. (fl. 1861), 17th Lancers.
Saunders, Samuel (fl. 1780–92). Of Leatherhead.
Scoffern, John (fl. 1839–70), M.B. 'Outlines of Botany,' 1857.
Scott, Hercules R. (fl. 1836). Of Edinburgh. Advocate.
Sealy, — (d. before 1834). Collected in co. Cork.
Seward, John (fl. 1794), M.D., A.L.S. Of Worcester.
Shakespear, Roger (fl. 1777–82). Sent N. American pl. to Banks.
Sheppard, John (fl. 1848). Of Bristol. 'On Trees,' 1848.
Sheppard, Rev. Revett (fl. 1828). Found hybrid *Typha* in Essex.
Sherbrooke, Mrs. (fl. 1807). Of Oxton, Notts.
Short, Thomas Kier (fl. 1838). Of Martin Hall, Notts.
Simmonite, William Joseph (1840–54). Of Sheffield.
Skellon, William (1848–51). Of Liverpool and Australia.
Skinner, — (fl. 1772). Of Oxford. *Skinnera* Forst.
Smiles, F. H. (d. 1895). Of Siam Survey.
Smith, Mrs. (*née* Macdonald) (fl. 1839). In Tasmania.
Smith, Alexander (fl. 1759). Surgeon. Of Croydon.
Smith, Charles H. J. (fl. 1852). Landscape gardener. Of Edinburgh.
Smith, Edward (fl. 1858). Lecturer on Botany, Charing Cross Hospital.
Smith, Henry (fl. 1816), M.D. Of Salisbury Infirmary.
Smith, Thomas (fl. 1818). Microscopist. Friend of R. Brown.
Spittal, Robert (fl. 1829–46). Surgeon. Of Edinburgh.
Stackhouse, T. (d. 1886). Commander R.N. Of New South Wales.
Staunton, John. Of Longbridge, Warwick. Diatomist.
Stephenson, John (fl. 1831), M.D. Edin. 'Medical Botany.'
Stewart, R. B. (fl. 1835). 'Outlines of Botany,' 1835.
Stroud, T. B. (fl. 1821). Landscape gardener. Of Greenwich.
Stuart, Charles (fl. 1842). Collected in Tasmania.
Swales, J. (1864 ?–1908). Of Whitby.
Synnot, W. (fl. 1825). Resided at the Cape.

Taylor, Joseph (fl. 1812–36). Of Newington Butts. Arborist.
Thompson, H. T. (fl. 1827). 'Vegetable Physiology.'
Thompson, John (1798). 'Botany Displayed.'
Thompson, Rev. T. (d. 1810). Of Penzance.
Tidyman, Philip (d. 1850), M.D. Göttingen, 1800.
Titford, William Jowit (fl. 1811), M.D. 'Hort. bot. americ.'
Tooley, Prof. — (fl. 1841). Collected in Ægean.
Travis, William (fl. 1795–1836). Of Scarborough. A.L.S.

Underwood, John (fl. 1800). Superintendent, Glasnevin.
Urquhart, Col. (fl. 1860). Collected in China.

Waring, Miss S. (fl. 1827–41). 'The Meadow Queen.'
Watkins, Charles R. W. (fl. 1855–74). Captain, Bombay Army.

Watson, Alexander (fl. 1825). Of St. Helena.
Wauch, Captain (fl. 1824). Of Foxhall. Mycologist.
Waugh, Richard (fl. 1805). 'Bot. Guide, Northumb. & Durham.'
Webster, — (fl. 1803–40). Surgeon H.M.S. "Chanticleer."
Weighill, William (d. 1802–3). Of Sunderland. A.L.S.
Wenham, Hon. — (d. 1796 or 7). Friend of Sibthorp.
Westcott, G. B. (fl. 1838). Cat. of Birmingham Garden.
Wheeler, James (fl. 1763). Nurseryman. Of Gloucester.
Whitaker, John (fl. 1830). Of Lewes ? Algologist.
White, David (fl. 1808). Surgeon, Bombay.
White, John (d. before 1845). Gardener, Glasnevin.
White, Taylor (fl. 1755). F.R.S. 1725.
White, W. H. (fl. 1831–42). Orig. Memb. Bot. Soc. Lond.
Whitfield, Thomas (fl. 1843–8). Collected in Sierra Leone.
Wildgose, Robert (fl. 1820–30). Of Daventry.
Wilkinson, George (fl. 1803). Surgeon. Of Sunderland.
Williams, Charles (fl. 1828–35). Of Salisbury.
Williams, Joseph (fl. 1848–55). Lecturer, Dublin.
Williams, J. (fl. 1825). 'Dissert. de succi circuitu.'
Williamson, T. (fl. 1842). Private 72nd Reg. In Natal.
Wilmer, Bradford (fl. 1781). Surgeon. Of Coventry.
Wilson, — (fl. 1740). Tailor, of Norwich.
Wilson, Edward S. (fl. 1846). Of Buglawton, Cheshire.
Wilson, R. (fl. 1800). Of Medomsley, Durham. Drew fungi.
Withers, Robert (d. 1856). Of Bath.
Withers, Mrs. (fl. 1831–4). Artist.
Wood, Mary Bristow (fl. 1845–9). Governess.
Woollgar, Thomas (fl. 1800). Of Lewes.
Wyburd, H. (fl. 1810). 'Introd. to Linnean Classification.'

Young, Edward (fl. 1856). Of Waincyrch, Neath.
Young, Rev. John (fl. 1829–59). 'Trees and Flowers in Scripture.'

SOUTH KERRY PLANTS.

By Rev. E. S. Marshall, M.A., F.L.S.

My wife and I spent a few days at Cloghane, about the middle of June, 1911, mainly in order to explore the upper part of Brandon Mountain, which bad weather had prevented on a previous visit. On this occasion we were more successful; but a second ascent, made with the intention of working the fine corrie below Brandon Peak, was quite spoilt by dense mist and soaking rain: so that we were obliged to grope our way to the summit, and descend by our former route, without working any new ground. However, I succeeded in getting samples of most of the "mossy" Saxifrages which occur on this range, and have several in cultivation (incidentally I may mention that I shall be grateful for any localised roots of that group from the British Isles, as I am attempting a revision of the genus, so far as it is represented here). At present I am strongly inclined to believe that we have at least three or four good species besides those recognized in our text-books; but the synonymy is very difficult, and the task of distinguishing the segregates is complicated by the fact that they certainly hybridize with much readiness in cultivation, and probably also in nature, where different species occur together.

Saxifraga elegans Mackay. An authentic specimen in the Edinburgh Herbarium is clearly *S. umbrosa* L. var. *punctata* (Haworth) D. Don × *S. Geum* L. var. *serrata* Syme. I gathered very similar specimens on Brandon, at 2500 ft., and have found various forms of the same hybrid on this mountain, Connor Hill, &c. The small form of *S. Geum* var. *dentata*, often called '*elegans*,' is quite different.

S. hirsuta L. The plant of the Linnean Herbarium, which appears to be the normal Pyrenean form, has *crenate* leaves, with a very broad cartilaginous border; it is glabrous but for some scattered hairs on the petioles. In Ireland the type seems to be extremely rare; but there is a specimen in Smith's herbarium, collected at the Gap of Dunloe in 1804 by Mackay, which plainly comes under it. The leaves are oval, mostly with a shallow cordate base, and have a broad cartilaginous border; lamina glabrous; petiole long, rather slender, very hairy (the name *hirsuta* seems to have been given in contrast to *S. umbrosa*, and is not very appropriate). The prevailing Irish form of *S. hirsuta* clearly deserves varietal distinction, and may be described as follows:— "Var. *acutidens*, n. var. Foliorum lamina dentibus acutis serrata (neque crenata), basi subtruncata, rarius leviter cordata, margine cartilagineo angustissimo, in pagina superiore sæpius pilis crispulis validis albidis munita." This is parallel to *S. Geum* var. *serrata* Syme; which is by far the most frequent Irish form of *S. Geum*, the crenate-leaved type being quite rare.

S. ? hirsuta L. var. *acutidens* × *umbrosa* var. *punctata*. Connor Hill, in a small form; no doubt it is of fairly frequent occurrence, as these plants cross very freely. Some leaves are broader than long; this points to a *hirsuta* rather than a *Geum* origin.

S. Geum var. *serrata* × *umbrosa* var. *serratifolia* (Mackay) D. Don, n. hybr. (Ref. No. 3644). Very scarce on Connor Hill. The inflorescence closely resembles that of *S. serratifolia* (which appears to me to deserve at least subspecific rank, and keeps thoroughly constant after eight years' cultivation); petiole somewhat flattened, with a slightly raised, membranous, long-ciliate margin, usually rather dilated at the top; lamina coriaceous, markedly cordate-truncate at the base, deeply and sharply serrate-dentate, with a narrow cartilaginous margin, ovate to oblong in outline, nearly parallel-sided, narrowed above to the acute or rounded tip, punctulate on both surfaces, greyish beneath, mostly with some scattered, stiff, whitish hairs, especially above, but sometimes glabrous. This is a handsome, striking plant, which I had not seen before; it should also be found in the Gap of Dunloe and other places where the parents are associated.

S. hirta Donn. Varies greatly on Brandon, where it ranges from about 2000 to 3140 ft.; but it always keeps quite distinct from the *S. decipiens* (*S. palmata* Sm.) of Twll Du, Carnarvonshire, the Aran Isles, and other Irish stations, and also from the Black Head (co. Clare), &c., species known to us as *S. Sternbergii*; I have all three growing, and no one could consider them identical. As yet I have seen this only from Ireland, and it may be endemic there, though Engler (Mon. Sax. p. 188) makes it a synonym of *S. Sternbergii*; indeed, his treatment of this series leaves much to be desired, and the various forms cannot reasonably be grouped under a *species collectiva* (*S. decipiens* Ehrh.), as he has done. Pending further study, I pass over the other critical Brandon plants; merely remarking that what I suppose to be *S. cæspitosa* Mackay (non L.) is evidently a true species, which as yet I have seen from no other station.

Taraxacum spectabile Dahlst. Common on Brandon (up to 2500 ft.) and Connor Hill; also seen near Lough Camelaun. Probably general on the Kerry Mountains, and exactly like the plant of the Scottish Highlands. It was mostly quite past flower at the time of our visit, except at the higher levels; from *T. palustre* DC., which I failed to find, it can at once be separated by its deep orange-yellow flowers and hairy leaves, which are also more runcinate and irregularly cut, as well as by the absence of a rather broad hyaline border from the outer phyllaries. Not previously recorded from Ireland, I think, though it must have been gathered.

Jasione montana L. The only form observed by me in this district is the larger, biennial plant called var. *major* by Mertens and Koch, which ascends to 2000 ft. or more on Brandon.

Isoetes lacustris forma *longifolia strictior* Caspary. Abundant at the north-east end of Lough Camelaun, in two to four or five feet of water; I did not see the normal plant here, though it was gathered in Lough Doon, and in a muddy pool, high up, on Brandon. Mr. Arthur Bennett, who kindly named it for me, pointed out some marks of difference from *I. Morei* (*I. lacustris* var. *maxima* Blytt = var. *Morei* Syme); but Prof. Hugo Glück, who examined my specimens, remarked that it was very like the Wicklow var. *Morei*, as observed by him in the unusually dry summer of last year. It varied from seven to fourteen inches (or more) in length.

NEW SOUTH AFRICAN MARINE ALGÆ.

By W. Tyson.

Through the courtesy of Major Reinbold I am permitted to publish the following three descriptions, which he kindly sent to me, of seaweeds new to science:—

Rhabdonia natalensis, n. sp. E. radice fibrosa surgens coccinea, teretiuscula, ultra setacea, usque 15–20 cm. alta, irregulariter dichotoma et superne parce lateraliter ramulosa; ramis admodum elongatis, ramulis plerumque acutis; cystocarpiis infra apices ramulorum æque circumcirca prominulis; tetrasporangiis zonatim divisis in ramulis leviter incrassatis et subnematheciosis densius sparsis (?).

Substantia frondis exsiccatione fere cornea. Near Cape Morgan, *Flanagan*; Kowie, *Becker*.

The plant bears some resemblance in habit to *Trematocarpus* (*Dicurella*) *fragilis* or rather to *Gigartina flagellifera* Kg., Tab. Phyc. xviii. t. 5, and *Trematocarpus elongatus* Kg., *ibid*. t. 4. The structure of the frond seems to be the same as in *Rhabdonia dendroidea* Harv. (see J. Agardh, Epic. p. 391, 1892). In the position and evolution of the cystocarps our plant agrees with *R. coccinea* and *R. dendroidea*, while the tetraspores seem to be arranged nearly as in *R. compressa* J. Ag. Anal. Alg. p. 116. I have examined only a single not well-preserved tetrasporiferous specimen. I must not omit to remark that from the three mentioned species of *Rhabdonia* our plant differs by the mode of ramification and by other signs. In Herbb. Reinbold, Becker, Tyson, and Flanagan, no. 278.

Nemalion furcellatum, n. sp. C. 4–6 cm. alta tereti-uscula, gelatinoso-membranacea, dichotomo-decomposita fastigiata, subflabellata; axillis acutis, apicibus segmentorum obtusis sæpe furcatis.

Antheridia generis, cystocarp. et tetrasp. ignotis! Table Bay. In Herbb. Reinbold, Becker, Tyson.

Gigartina Tysoni, n. sp. C. 5 cm. alta, carnoso-cartilaginea, dichotomo-subfastigiata, subflabellata, fere tota articulato-constricta; apicibus cuneatis, sæpe bi- vel trifidis, obtusis; cystocarpiis subhemisphericis in disco segmentorum terminalium evolutis; tetrasp. et anther. ignotis! Table and Kamp's Bays.

The plant externally somewhat resembles *Hormophora australasica* J. Ag., but differs from it by its internal structure. Some slight resemblance might also be found with *Gigartina? Valdiviæ* Reinb., as this plant, too, shows, here and there, joint-like constrictions, but *G. Valdiviæ* is a much stronger plant of a quite different mode of ramification, and the joint-like constrictions are of accidental character, whereas in *G. Tysoni* the whole plant almost is distinctly and characteristically articulated. In Herbb. Reinbold, Becker, Tyson.

I may add that the *Nemalion* and *Gigartina* are, so far as I am aware, extremely rare. The first, hitherto, has been confined to Three Anchor Bay, an inlet of Table Bay, and appears to be an annual seldom seen after New Year, and with whose habitat I am unacquainted. In course of the past four years, hardly a dozen specimens were collected. The second has only been gathered after stormy weather in "wash-ups" during the same period mentioned, in much the same quantity, and it probably grows in deep water. Found at Kamp's Bay, Sea Point, Three Anchor Bay, all in the Cape Peninsula, at one or other time from May to October.

SHORT NOTES.

Alchemilla acutidens Buser in Britain.—During the International Phyto-Geographical Excursion in August of 1911, Dr. Ostenfeld pointed out this plant on Ben Lawers, first on a rock by the Carrie burn, at about 1200 ft., and also in several other places on the hill up to 3500 ft., and also on rocks above Lochan a Chat. It is kept as a distinct species by H. Lindberg (*Die nord Alchimilla-vulgaris Formen*, p. 111, t. 16, 1909), but is closely related to *Alchemilla alpestris*, with which, indeed, it has been sometimes confounded in Britain. My specimens from Nant Francon, Carnarvonshire, collected in 1899, are, according to Dr. Ostenfeld, not *alpestris* but *acutidens*, and to this also belong Mr. McTaggart's Linlithgow specimens, distributed through the Botanical Exchange Club in 1910; specimens collected by the Rev. E. S. Marshall at Inchory, Banff, in 1905, are said by Dr. Moss to be the same form. My specimens of *A. alpestris* from Middlesex are correctly named. Lindberg thus describes the two plants (*op. cit.* p. 42) :—

A. acutidens Buser.—" Caules usque ad ramulum floriferum secundum vel raro tertium et petioli ± pilosi, folia subtus nervis per totam longitudinem ± pilosis. Inflorescentia lata, multiflora, densa, subcorymbosa, stipulia profunde incisa, folia viridia, orbicularia vel reniformia, 9- vel rarius incomplete 11-loba, supra glabra vel rarius in plicis pauci-pilosa, lobi dentibus conformibus, utrimque (7) 8–9 (10), acutis vel acutiusculis, dens apicalis vicinis æquilongus et conformis, raro paullo brevior, flores subvirides, sepala et episepala angustioria et acutioria."

A. alpestris Schmidt.—" Caules tantum in internodio primo ± dense et in internodio secundo ± parce pilosi, fere numquam usque ad ramulum floriferum infimum pilosi, petioli ± parce pilosi vel subglabri, omnino glabri, folia magna, reniformia, dilute viridia, 9- vel raro incomplete 11-loba, supra glaberrima (tantum in dentibus breviter pilosiuscula) vel rarissime in plicis paucis munita, subtus tantum secus apices nervorum adpresse pilosa, lobi dentibus utrimque (6) 7–9 (10), dentes inæquales, dens apicalis parvus, vicinis multo minor, inflorescentia vulgo satis angusta, flores vulgo flavo-virentes."—G. C. Druce.

Equisetum hyemale Linn. in Hants.—Specimens of *Equisetum hyemale* L. were sent me in February by Mr. J. F. Rayner, who, in company with Miss Mabel Moore, found a large quantity of it, apparently quite native, in a peninsula of damp clay ground formed by the winding of Tanner's Brook, in Lord's Wood, four miles from Southampton. The spot, Mr. Rayner tells me, is in district vii (2), not far from the boundary of vi (2), of the *Flora of Hants*. In the southern counties it is only known for Somerset N. (one locality), for Surrey, and for Kent E., one locality, recorded in Phytol. v. 45 (1853), by W. Borrer, on specimens from the Rev. G. E. Smith, a locality which the authors of the *Flora of Kent* were not able to trace. Mr. Rayner in answer to a question replied, " I never heard of any plant being introduced in this wood, and I think we may safely dismiss the idea" of its introduction.—E. F. Linton.

REVIEWS.

A Manual of Structural Botany: an Introductory Text-book for Students of Science and Pharmacy. By Henry H. Rusby, M.D. Pp. viii. 248, with 599 illustrations. J. & A. Churchill. Price 10*s.* 6*d.* net.

This book, though bearing the imprint of English publishers, is written in American and printed in America. Such peculiarities of spelling as "luster" and "center" which result from this origin are less likely to be of consequence to English students than the numerous technical terms, many of them new, in which several of our Transatlantic friends seem to delight. The purism which substitutes "perigone" for "perianth" seems to us excessive, and we fail to see any advantage in terming flowers without essential organs "neutral" instead of "neuter." Dr. Rusby styles the fruit-head of *Compositæ* an "anthodium" but the individual cypselæ "akenes," comparing them to the nut or "nuca" in *Fagus* of which there may be several in a "glans," which he styles a fruit, although the product of several flowers. If there is to be any logic in terminology, it is surely misleading to use this term "anthodium" also for the flower-head.

As the type is large, the amount of matter in the volume is not very great, and the description sometimes becomes little more than a glossary. The all but complete ignoring of function imparts a dryness to such a treatment of mere form as may well repel the student; whilst, as it is part of the author's theory of teaching—a theory with which we do not agree—to confine the first-year student to the simple microscope, histology is also omitted. The endeavour to give much information in a small space has sometimes resulted in obscurity, as, for example, in the following passage:—

"The ancestral organ and its developed product are called Homologues of each other, and an Homology or Affinity is said to exist between them. For example, the leaf of a plant, and the petal of its flower, which we assume to have developed through the modification of the leaf, are homologues of one another. When they are only similar, without any genetic relationship, they are Analogues of each other, and Analogy exists between them."

Now leaves and petals can never be analogous, as grammatically they are here said to be. This mention of "the modification of the leaf" strikes us as somewhat old-fashioned; and it is surely taking a very narrow view of teratology to speak of it as referring only to "abnormal retrograde metamorphosis." As the author says, "only an insignificant portion of the Materia Medica includes the bodies of flowerless plants, so that the great division of Cryptogamic botany, as regards its detailed treatment, is not essential to Pharmacognosy." This being so, the one chapter of eleven pages devoted to them seems to us a mistake. On the other hand, the brief chapters devoted to the laws of nomenclature and to the collection and preservation of specimens are excellent.

The numerous illustrations, though largely drawn from unfamiliar plants, are certainly preferable to the hackneyed reappearances to which we are only too accustomed; but both in them and in the text we have been struck with the comparatively slight reference to species of special pharmacological interest.

If, as we think may well be the case, pharmaceutical students require an introductory text-book other than that used by other students, we fear that in England they will consider half-a-guinea rather a high price for one covering only their first year's work. Considering his well-known special knowledge of the subject, we look forward to the companion volume on Commercial Pharmacognosy which is promised in the Preface, and which will cover ground far less preoccupied than does the volume now under notice.

G. S. Boulger.

Suffolk Plants.

The account of the flowering plants of Suffolk which Mr. C. E. Salmon contributes to the recently issued "Victoria History" of the county was, we understand, prepared by him in 1906, and is thus a little belated in appearing. But this does not materially detract from its usefulness, and the future author of a complete Flora of the county will be grateful to Mr. Salmon for this careful summary of what is known to the time of its compilation. He will also be grateful for the careful division of the county into (five) botanical districts based on the river basins; and, although he may amplify, he will find little if anything to correct in the list of Suffolk observers which precedes the account of the plants. We do not, however, understand why Mr. Salmon speaks of Miller's reference to *Lathyrus maritimus* in Gard. Dict. ed. 8 (1768) as "the earliest mention of a Suffolk plant"; the extract he gives shows that the use of the plant in a period of dearth (1555) is noted by Stowe and Camden, and Miller himself records it in his first edition (1731). Mr. Salmon adds "(!)" to his mention of "the fact," but is there any sufficient reason for doubting its accuracy? We think that "Mr. Barker of Beccles, an industrious botanist who," as Buddle, writing about 1697, tells us, "without banter knows to a yard square of ground where every rare plant of [Lothingland] grows, having search'd for it for these severall years past" (see Journ. Bot. 1901, 78), may claim precedence of Sir John Cullum as "undoubtedly the first botanist resident in the county."

Suffolk has a larger number of flowering plants than either of its adjoining counties: Mr. Salmon places its record at 1180 species as against 1197 for Norfolk, 1083 for Essex, and 1007 for Cambridge. The rarer plants are for the most part also found in Norfolk and Cambridge, the one "unique production" of the county being *Pulmonaria officinalis*, discovered at Burgate in 1862 by C. J. Ashfield and considered by Mr. Marshall, who has seen it there, to be "a true native of Suffolk."

The "species worthy of special notice" are treated separately under each of the districts; "those unique in [each] division [are printed] in larger type"—an unnecessary distinction, it seems to us, and one which gives the printed page a singularly unpleasing appearance. Mr. Salmon has condensed into small space a great amount of information as to dates, localities, &c., and in this sets an example of conciseness which might well be followed by future writers, and contrasts favourably with that of some who have preceded him in these County Histories. A "complete list" follows these district enumerations.

A Monograph of the British Desmidiaceæ. By W. & G. S. West. Vol. iv. Ray Society, London, 1912. Pp. xiv and 191; plates 96–128.

All algologists will welcome the appearance of the fourth volume of this highly useful work. An interval of nearly four years has passed since the publication of the third volume, and it is to be hoped that the two remaining volumes will appear in more rapid succession. The number of species of Desmids has become so considerable and their descriptions are so scattered that a careful monograph such as this has become a matter of urgent necessity. Now that the genus *Cosmarium*, with its two hundred and fifty-one species and numerous varieties, is completed, the authors may be congratulated on the successful accomplishment of a very difficult task. It is necessary to attempt the determination of a species of this genus with other available sources to realize the debt that we owe to the authors.

Apart from the completion of the genus *Cosmarium*, the volume deals with the genera *Xanthidium* and *Arthrodesmus*, and with the first forty-one species of *Staurastrum*. The great diversity of the species of the last-named genus renders a classification particularly difficult. Messrs. West do not accept Lundell's subgenus *Pleurenterium*, since the character on which it is based (*viz.* parietal placing of the chloroplasts) is doubtful, and has the effect of bringing together a number of species which appear to have no other relationship with one another. The authors distinguish two divisions, depending on the absence or presence of processes at the angles of the semicells; the species are further classified into ten sections, based on the shape of the cell and the character of the membrane. This system serves to classify the bulk of the species, but there are a number of intermediate forms of which the exact systematic position is somewhat doubtful. As in the case of *Cosmarium*, we are probably dealing with a genus in active process of evolution in which the numerous intermediate types render an ideal classification impossible.

A number of new varieties and three new species (*Xanthidium Orcadense*, sp. n., *Staurastrum pilosellum*, sp. n., and *S. inflatum*, sp. n.) are described in the present volume.

F. E. F.

Practical Botany. By F. Cavers, D.Sc., F.L.S. W. B. Clive. Pp. xvi, 408, with 92 text-figures. Price 4*s.* 6*d.*

We do not remember any book of its class and size that attempts quite as much—and accomplishes much—as does this little volume of 400 pages. It is divisible into three equal sections—the histology of angiosperms, physiology, and the life-histories of typical cryptogams and gymnosperms. That this, no less and no more, is its scope is obviously not explained by its title. The execution of the whole work is excellent, at once intelligible, fully detailed, accurate, and thorough. It is not a book to be crammed, nor does it lend itself to hurried, makeshift and slip-shod methods. It will, in fact, be the despair of teachers without proper laboratories and of those who are able to devote but a very few hours weekly to botanical teaching. Dr. Cavers, in his preface, expresses the opinion that "no candidate should be allowed to pass in Botany at such examinations as the Intermediate Science and Arts of London University unless able to produce satisfactory proof of having worked through a practical course in Organic Chemistry." As a substitute for such a course, after an excellent chapter on microscopic work, the author (in one dealing with cell-contents and cell-wall) describes a series of test-tube reactions for the chief classes of vegetable organic bodies.

In the chapter on histology we are given a full series of types, the stems, for example, of Marrow, Sunflower, *Aristolochia*, *Elodea*, *Hippuris*, Lilac, Lime and Elder being employed to illustrate Dicotyledons; and the aërial roots of epiphytic orchids, the haustorium of *Cuscuta*, mycorhizæ, and hydathodes are all included.

In the chapters on physiology the chief pieces of Ganong's "Normal" set of apparatus are figured and their use insisted upon. The need for expenditure on such apparatus in connection with botanical teaching is, perhaps, not yet generally recognized.

The series of life-histories is a full one, *Cycas* and the Yew being included, as well as *Pinus*. They are illustrated by an admirable series of original diagrams, some of which, such as the whole pages devoted to sections of Pine-wood, to the sporangium of *Pellia*, or to *Puccinia*, seem to us unnecessarily large.

Dr. Cavers should not have allowed his printers to bestow initial capitals upon the specific names of *Saccharomyces cerevisiæ*, *Agaricus campestris*, *Puccinia graminis*, *Xanthoria parietina*, and *Taxus baccata*.

G. S. BOULGER.

BOOK-NOTES, NEWS, &c.

AT the meeting of the Linnean Society on May 2nd the General Secretary placed before the meeting a summary of his recent investigation of the Linnean Herbarium. He stated that a full catalogue of its contents had long been desired, but difficulties have stood in the way of a complete catalogue. The present list was on a modest scale, and only aimed at indicating which of the Linnean types are represented in the Herbarium verified by himself, and these will be shown in the list by special type. This will probably obviate much correspondence, and many useless references in search of species not contained in the Herbarium. It is hoped that the "Index" may be printed by the autumn of the present year. It was found in the course of investigation that Sir J. E. Smith had transferred no fewer than one hundred and ten species to genera other than those assigned to them by Linné; these have now been restored to their original position. Three signs, which had been a puzzle to botanists since the days of the younger Linné, have been interpreted; and another discovery shows that Linné had catalogued his plants as late as 1767, making three enumerations.

In connection with the forthcoming *Cambridge British Flora*, a meeting of the contributors and a few other British botanists was held on March 7th last at the rooms of the Linnean Society, the Council of which had kindly granted permission for the purpose, Dr. Rendle occupying the chair. Dr. Moss stated that he had decided to follow Engler's system of classification in the *Flora*, and that the illustrations, except in very special cases, would be drawn by Mr. Hunnybun from fresh plants. The method of citing the synonyms, icones, and exsiccata was discussed at some length, and various recommendations were made, which Dr. Moss undertook to consider. The drawings of the enlargements of the plants were considered; it was thought by some that these should be to some extent diagrammatic, but both Dr. Moss and Mr. Hunnybun preferred that the enlargements as well as the main drawings should merely imitate the object, so long as the reproductions were quite clear. Mr. Clement Reid hoped that the minute sculpturing of seeds would be illustrated, but it was felt by others that this type of work would require a special monograph. Mr. Compton raised the matter of describing hybrids, but apparently the contributors have not yet realized the fundamental importance of recent results of Mendelian workers. Mr. A. G. Tansley, in a letter, expressed the hope that proper attention would be paid to the description of the habitats of the plants, and that it would be made quite clear whether or not the plants were indigenous in these habitats; these matters are too frequently lost sight of by field botanists. Mr. Druce wrote entering a formal protest against "Germanizing our flora" by the adoption of Engler's system of classification; but in doing this Dr. Moss has been guided not merely by his own feeling in the matter, but by the advice of the leading systematists of this country. The meeting was in every way successful, and there can be no doubt that the *Flora* will gain by the friendly discussion which took place.

International Botanical Congress of London, 1915.—The first meeting of the General Committee was held at the Linnean Society's rooms on May 17th, Professor A. C. Seward presiding. The following were elected as Vice-Presidents:—Prof. I. B. Balfour, Mr. W. Bateson, Dr. F. F. Blackman, Mr. Francis Darwin, Prof. H. H. Dixon, Mr. G. C. Druce, Prof. J. B. Farmer, Mr. A. D. Hall, Mr. W. B. Hemsley, Dr. R. Kidston, Prof. F. W. Oliver, Mr. Lloyd Praeger, Miss E. Sargant, Dr. D. H. Scott, Mr. A. G. Tansley, Prof. S. H. Vines, Mr. H. Wager. The Executive Committee was completed by the selection of the following botanists to act in conjunction with the Officers, namely, Prof. J. B. Farmer, Mr. A. W. Hill, Prof. F. Keeble, Prof. F. W. Oliver, Mr. A. G. Tansley, and Miss E. N. Thomas. It was also decided to ask a number of eminent ladies and gentlemen, either botanists, or interested in botany or allied subjects to act as Patrons, namely, the Duchess of Bedford, the Duke of Teck (President of the Royal Botanic Society), Lord Avebury, Lord Ducie, Lord Redesdale, Sir Trevor Lawrence (President of the Royal Horticultural Society), the President of the Board of Agriculture, Sir W. T. Thiselton-Dyer, Sir John Kirk, Sir Herbert Maxwell, Rt. Hon. Lewis Harcourt, Miss E. M. Willmott, and the Hon. N. C. Rothschild. Some discussion took place as to the most suitable time of year for the meeting, but no definite decision was arrived at.

Prof. Saccardo is to be congratulated on the publication of the twenty-first volume, being the eighth of the supplement, of his monumental *Sylloge Fungorum.* He calls attention in his preface to the enormous number of new fungi—"factum sane mirandum!"—which have been published in the less than five years which have elapsed since the publication of his last volume, and indicates various directions in which new volumes have been planned. The present volume has xv + 928 pages and costs 59 francs; it is published by the author at Padua. In common with those preceding, it is admirably printed and fully indexed. Mr. Alexander Trotter has collaborated with Prof. Saccardo in its production.

The *New Phytologist* for April contains an interesting account by Dr. Ostenfeld of the "floristic results" of last year's International Phytogeographical Excursion, which should be read in conjunction with Mr. Druce's account published in the same Journal for December last, to which we made some reference on p. 72. It would appear that the *Nymphæa candida* recorded by Mr. Druce on Dr. Ostenfeld's authority is, on the same authority, not that plant but a new variety (*occidentalis* Ostenf.) of *N. alba*; the supposed *Sagina glabra* Fenzl is not that species; and the claims to specific rank of *Juncus bufonius* var. *ranarius* are disallowed. Other remarks in Dr. Ostenfeld's paper confirm the view which we have more than once urged in these pages, that greater caution and more careful observation should be exercised in the addition of new names to our British plant-lists, which is sometimes made with undue haste and without sufficient investigation.

We note the appearance in sevenpenny fortnightly numbers of what seems to be a pretty and useful book on *Wild Flowers as they Grow*, the coloured plates by H. Essenhigh Corke, with descriptive text by Mrs. Clarke Nuttall, whom the publishers, Messrs. Cassell, describe as "one of our foremost botanical experts."

Messrs. Routledge, who last year published Mr. H. S. Thompson's volume on *Alpine Plants of Europe*, have been encouraged by its favourable reception to undertake a companion work by the same author on *Sub-Alpine Plants*, in which the flowers of the Swiss woods and meadows will be similarly dealt with. It will be illustrated by thirty-three coloured plates, from drawings by Mr. George Flemmell.

We have received an account of *The Flora of Banffshire* by William G. Craib, M.A., reprinted from the Transactions of the Banffshire Field Club, to which body it was presented on Nov. 2, 1911. The main part of the work is in tabular form, each species being traced through the twenty-seven districts into which the county has been divided. The Roses have been named by Mr. Barclay, many of the Rubi and Hieracia by Mr. Rogers and Mr. Linton respectively: a localized list precedes the tables.

Miss Ida H. Jackson's *Botanical Experiments for Schools* should be of value to those who are trying to teach the elements of botany to children. The experience of examiners is that experiments are generally described from a book, or at best from the observation of experiments carried out by the teacher. The object of the author in this case is to supply the children with a book of instructions for carrying out themselves, presumably under supervision, a series of simple experiments illustrating the principles of plant physiology. Thirty experiments are described, the results and conclusions to be drawn from them are placed, like the answers to sums, separately at the end of the book. The directions for each experiment are accompanied by a page illustration in half-tone from very clear drawings by a former pupil of Miss Jackson. This useful little manual is published by Messrs. Blackie, price 1s. 6d.

Under the title *Plant Life*, Messrs. G. Allen & Co. publish a translation by Melta M. Rehling and Elizabeth M. Thomas of Dr. Eugene Warming's small text-book (the translation is made from the fourth edition of his Danish by Eug. Warming and C. Raunkiaer). The little volume, which contains 244 pages, with 250 illustrations, is well printed and nicely produced, but seems somewhat dear at 4s. 6d. The elementary facts of plant-life are clearly stated, and the book may be recommended to those who are seeking an introduction to the study of botany from the standpoint of the plants themselves. The sixteen chapters deal with the various life-processes which are studied experimentally, the structure and function of the different organs, with a final chapter on plant-ecology, in which the principal Danish plant formations are described.

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THE GENUS *CRASSOCEPHALUM* MOENCH.

By SPENCER LE M. MOORE, B.Sc., F.L.S.

MOENCH (Meth. p. 516 (1794)) proposed this genus as a resting-place for *Senecio cernuus* L. fil. (Suppl. p. 370 (1781)).* His description is a poor one, and he missed the only good character justifying his course, *viz.* that of the style-arms, while his statement "ab *Senecione* calyce monophyllo plane differt" is incorrect. In 1825 the same plant was studied by Cassini (Dict. xxxiv. p. 389), especially with reference to its peculiar style-arms, which he described with his usual accuracy. Cassini objected to the retention of Moench's name, not only on account of errors in description, but because the fault of hybridism attaches to it, and in lieu he proposed the name *Cremocephalum*, which A. P. de Candolle (Prod. vi. p. 297 (1837)) and Miquel (Fl. Ind. Bat. ii. 97 (1856)) adopted. Cassini (*op. cit.*) immediately proceeded to characterize a second genus, *Gynura*, the difference between which and *Senecio* relates, as in the other case, entirely to the style-arms, these organs, as he observes, being more like those of *Vernonia* than of *Senecio*. The style-arms of *Crassocephalum* differing from those of *Senecio* in the presence of a filiform appendage to the otherwise truncate and penicillate style-arms of *Senecio*, it is clear that *Crassocephalum* and *Gynura* are quite different genera.

Lessing (Syn. Comp. p. 395 (1832)) failed to endorse Cassini's views. Evidently he did not attach sufficient importance to style-arm characters in this immediate group, in spite of the notice directed to them by Cassini, for under *Crassocephalum* he included not only *Emilia* but even *Gynura* as well. De Candolle (*op. cit.* pp. 298–300) restored all these genera, only adopting the name *Cremocephalum* for *Crassocephalum*, as already mentioned. He greatly enlarged *Gynura*, but his fourteenth species, *G. sarcobasis* DC., bears little resemblance to its congeners, and in fact is a *Crassocephalum*.

The next mistake lies at Bentham's door, who (Hooker's Niger Fl. p. 437 (1849)), although, if his view were correct, *Crassocephalum* would have priority, places *Crassocephalum cernuum* in *Gynura*, it thus becoming *Gynura cernua* Benth., and three other species, since reduced to two, having the style-arms of *Crassocephalum* are ascribed to *Gynura* in the same work. We find Bentham (Gen. Pl. ii. 445 (1873)) a quarter of a century later adhering to this view, and although keeping *Emilia* and *Notonia* apart from *Senecio*, still failing to appreciate the difference between *Gynura* and *Crassocephalum*. Oliver and Hiern (Fl. Trop. Afr. iii. 402 (1877)) commit the same fault, and O. Kuntze (Rev. Gen. Pl. i. p. 331 (1891)), trusting these views to be correct, takes the obvious course of restoring *Crassocephalum* to its historic position but *vice Gynura*, a proceeding which, as shown above, is without warrant. Hiern (Cat. Welw. Pl. i. p. 593 (1898) follows suit, and taking my cue from this authoritative lead, I have described four undoubted species of *Gynura* as Crassocephalums. We find the climax to this series of misapprehensions in the *Report of the Vienna Congress* (1905, p. 255), which pronounces that *Gynura* Cass. must be used in place of *Crassocephalum* Moench.

---

* I was in hopes that the type-specimen of *S. cernuus* L. fil. might be in the Linnean herbarium; but Dr. Jackson, who has kindly searched for me the catalogue he is preparing of the contents of that collection, tells me it is not there. This, however, is not an important matter, as an excellent figure of the plant is given by Jacquin (Hort. Vind. t. 98) under the name *S. rubens* Juss. The date of this work being 1776, it is clear that Jussieu's name has priority.

O. Hoffmann's classification of *Senecio* and its immediate allies (Engler & Prantl, Pflanzenfam. iv. 5, p. 295 (1894)) differs from Bentham's mainly in this, that he reads subgenus where Bentham reads genus. He also suppresses *Crassocephalum*, and includes by name *C. cernuum* in *Gynura*, thus giving a further lease to the mistake under notice, and this although the style-arms of *Gynura cernua* Benth. are certainly not those which he correctly gives as characteristic of *Gynura*. Recently these views have been emphasized by Dr. Reinhold Muschler (Engler, Bot. Jahrb. xlii. pp. 1–74 (1909)). In this essay Muschler almost succeeds in getting back to Cassini's original position, for he holds that the nature of the style-arms of *Gynura cernua* Benth. must cause its removal from *Gynura*, and justifies the plant being placed in a subgenus apart from the subgenus *Eu-Senecio*, which comprises the true Senecios. Unfortunately he has overlooked the facts cited above, or he would have seen that *Crassocephalum* was ready to his hand; instead of which he coins a new name (*Gynuropsis*) for his proposed subgenus. This name is highly appropriate, but it must yield to *Crassocephalum* on the ground of priority.

A few words will suffice to explain my own position. Remembering how important style-arm characters are in the classification of *Compositæ*, I am strongly averse to combining genera which differ in this most important particular. For me, then, *Emilia*, *Notonia*, and *Crassocephalum* are valid genera, and it is with unalloyed satisfaction that I find myself on this point in unison with two such capable observers as Cassini and A. P. de Candolle.

Muschler mentions only seven species as referable to his subgenus *Gynuropsis*, but further examination shows this estimate to be far too low. In fact, after study of British Museum material I find that there are no fewer than sixteen species of *Crassocephalum*, and further search at other herbaria will probably add to the number. These sixteen species may be arranged in the following manner:—

CRASSOCEPHALORUM CLAVIS.

1. Flowering-heads arranged in a dense mass.
a. Leaves pinnatifid, auricled at the base ...... 1. *C. subscandens.*
b. Leaves without auricles.
α. Leaves deeply and closely toothed.
Glabrous. Leaves with numerous lateral nerves 2. *C. multicorymbosum.*
Hairy. Leaves with five pairs of lateral nerves 3. *C. butaguense.*
β. Leaves distantly toothed or lobed .... 4. *C. biafræ.*
2. Flowering-heads more or less laxly arranged.
a. Inflorescences axillary .... 5. *C. Goetzenii.*
b. Inflorescences terminal.
α. Involucral leaves united below .... 6. *C. sarcobasis.*
β. Involucral leaves free.
* Leaves sessile and amplexicaul 7. *C. amplexicaule.*
** Lower leaves or all stalked.
† Capitula cylindrical ...... 8. *C. crepidioides.*
†† Capitula campanulate.
Leaves oblong-lanceolate 9. *C. picridifolium.*
Leaves ovate .... 10. *C. macropappus.*
††† Capitula broadly campanulate.
Leaves with broad auricles. Achenes hairy .... 11. *C. Ducis-Aprutii.*
Leaves with narrow auricles. Achenes glabrous .. 12. *C. Behmianum.*
3. Heads usually solitary.
a. Florets purple or blue.
Involucral leaves 12 mm. long .... 13. *C. rubens.*
Involucral leaves 8 mm. long .... 14. *C. Proschii.*
b. Florets yellow.
Leaves ovate to lanceolate, toothed or lobed 15. *C. vitellinum.*
Leaves narrowly oblong, entire .... 16. *C. uvens.*

The synonymy is as follows:—

1. C. SUBSCANDENS. *Senecio subscandens* Hochst. ex A. Rich. Tent. Fl. Abyss. i. 434; Oliver & Hiern in Fl. Trop. Afr. iii. 421; Engler, Pflanzenw. o.-Afr. C. 418; Hiern, Cat. Welw. Pl. i. 603.
2. C. MULTICORYMBOSUM. *Senecio corymbosus* Klatt in Ann. Naturh. Hofmus. Wien, vii. 103; Engler, *l. c.* C. 418.
3. C. BUTAGUENSE. *Senecio butaguensis* Muschler in Herzog zu Meckl. Zent.-Afr. Exped. 403.
4. C. BIAFRÆ. *Senecio Biafræ* Oliver & Hiern, *l.c.* 420. *S. Bojeri* Hook. f. in Journ. Linn. Soc. vii. 202, non DC.
5. C. GOETZENII. *Senecio Goetzenii* O. Hoffm. in v. Götzen Durch Afr. 383; Muschler in Engler, Bot. Jahrb. xliii. 58.
6. C. SARCOBASIS. *Gynura sarcobasis* DC. Prod. vi. 300; Engler, *l. c.* C. 416.
7. C. AMPLEXICAULE. *Gynura amplexicaulis* Oliver & Hiern, *l. c.* 403; Engler, *l. c.* C. 416.
8. C. CREPIDIOIDES. *Gynura crepidioides* Benth. in Hook. Niger Fl. 438; Oliver & Hiern, *l. c.* 403; Engler, *l. c.* C. 416. *G. polycephala* Benth. *l. c.* 438. *G. diversifolia* Sch. Bip.

ex Aschers. in Schweinfurth, Beitr. Fl. Æthiop. 156. *Senecio diversifolius* A. Rich. *l. c.* i. 437, non Wall. *S. crepidioides* Aschers. *l. c.* 155. *Crassocephalum diversifolium* Hiern, *l. c.* i. 594.

9. C. PICRIDIFOLIUM. *Senecio picridifolius* DC. Prod. vi. 386; Harvey, Fl. Cap. iii. 379; Oliver & Hiern, *l. c.* 413; Engler, *l. c.* C. 417; Hiern, *l. c.* i. 597; Muschler in Herzog zu Meckl. Zent.-Afr. Exped. 401. *S. acutidentatus* A. Rich. and *S. papaverifolius* A. Rich. *l. c.* 436, 437.
10. C. MACROPAPPUS. *Senecio macropappus* Sch. Bip. ex A. Rich. *l. c.* 436; Oliver & Hiern, *l. c.* 413; Engler, *l. c.* C. 417.
11. C. DUCIS-APRUTII. *Senecio Ducis-Aprutii* Chiov. in Pirotta Ann. di Bot. vi. 150; Muschler in Herzog zu Meckl. Zent.-Afr. Exped. 402.* *S. gynuroides* S. Moore in Journ. Linn. Soc. xxxviii. 263.
12. C. BEHMIANUM. *Senecio Behmianus* Muschler in Herzog zu Meckl. Zent.-Afr. Exped. 401, tab. xliii.
13. C. RUBENS. *Senecio rubens* Juss. ex Jacquin, Hort. Vindob. iii. 50, tab. xcviii. *S. cernuus* L. fil. Suppl. 370. *Crassocephalum cernuum* Moench, Meth. 516; Hiern, *l. c.* i. 593. *Cremocephalum cernuum* Cass. Dict. xxxiv. 391; DC. Prod. vi. 298; Miquel, Fl. Ind. Bat. ii. 97. *Gynura cernua* Benth. *l. c.* 437; Oliver & Hiern, *l. c.* 402; Engler, *l. c.* C. 416.
14. C. PROSCHII. *Gynura Proschii* Briq. in Ann. Jard. Bot. Genève, vi. 8.
15. C. VITELLINUM. *Gynura vitellina* Benth. *l. c.* 438; Oliver & Hiern, *l. c.* 402; Engler, *l. c.* C. 416.
16. C. UVENS. *Senecio uvens* Hiern, *l. c.* i. 602.

SPECIES EXCLUDENDÆ.

Crassocephalum aurantiacum O. Kuntze, Rev. Gen. Pl. ii. 331 = *Gynura aurantiaca* DC. Prod. vi. 300.

C. auriforme S. Moore in Journ. Linn. Soc. xxxvii. 171 = *Gynura auriformis* comb. nov.

C. Cusimbua O. Kuntze, *l. c.* ii. 331 = *Gynura Cusimbua* comb. nov. (syn. *Gynura angulosa* DC.).

C. densiflorum O. Kuntze, *l. c.* ii. 331 = *Gynura densiflora* Miq. Fl. Ind. Bat. ii. 99.

C. latifolium S. Moore in Journ. Bot. 1905, 141 = *Gynura latifolia* Elmer in Leafl. Philipp. Bot. i. 145 (*latifolium*).

C. miniatum Hiern, *l. c.* i. 595 = *Gynura miniata* Welw. Apont. 586.

C. notonioides S. Moore in Journ. Bot. 1902, 341 = *Gynura notonioides* comb. nov.

---

* Mention of *Senecio gynuropsis* Muschler (Herzog zu Meckl. Zent.-Afr. Exped. 404) has been omitted from the clavis, as, without seeing a specimen, I cannot distinguish it from *C. Ducis Aprutii.* Muschler lays stress on the large leaves, 8–13 cm. long and 3–3·5 cm. broad, of his proposed species, but the leaves of *S. gynuroides*, which he agrees with Chiovenda in regarding as conspecific with *S. Ducis-Aprutii*, are 9–11·5 × 3–3·5 cm. in size.

C. Pseudochina O. Kuntze, *l. c.* ii. 331 = *Gynura Pseudo-china* DC. Prod. vi. 299.

C. pubigerum O. Kuntze, *l. c.* ii. 332 = *Gynura sarmentosa* DC. Prod. vi. 298.

C. ruwenzoriense S. Moore in Journ. Linn. Soc. xxxv. 352 = *Gynura ruwenzoriensis* comb. nov.

C. scandens Hiern, *l. c.* i. 595 = *Gynura scandens* O. Hoffm. in Engler, *l. c.* C. 416.

SOMERSET PLANTS: NOTES FOR 1911.

By the Rev. E. S. Marshall, M.A., F.L.S.

Last season in this county was almost hopeless for botanists; in the spring we had six weeks' cutting east wind, and about four months of drought followed, turning the whole country-side into a parched desert. Under the circumstances, little work could be attempted; and I received hardly any information from correspondents. All the localities mentioned below are in v.-c. 5. S. Somerset; the districts are those of Murray's *Flora*. New vice-comital records are starred.

Ranunculus Lenormandi F. Schultz. 3. Clean Moor, between Wiveliscombe and Bathealton. — *R. parviflorus* L. 3. Stoke St. Mary, on the Lias; locally abundant.

Helleborus fœtidus L. 3. Hatch Beauchamp; only one fine plant seen, but not an obvious introduction.

Aquilegia vulgaris L. 3. In bushy, swampy ground, Slape Moor, between Wiveliscombe and Milverton; sometimes growing in the wet, open bog—a very unusual station. A true native, as far as I can judge.

Sisymbrium Thalianum Gay. 2. Stogumber.

Lepidium ruderale L. 3. Casual in a farmyard at Badger Street, near Staple Fitzpaine; I suspected that it might be one of the allied aliens, but Mr. C. E. Salmon so names it. Not previously noted for S. Somerset. In an open copse close by *L. campestre* Br. grew sparingly.

Raphanus Raphanistrum L. 3. Arable land, Bathealton; apparently very scarce in the county as a whole.

Polygala serpyllacea Weihe. 3. Clean Moor, &c., near Wiveliscombe.

Malva moschata L. 3. Wiveliscombe.

Rhamnus catharticus L. 3. Stoke St. Mary, on the Lias.—*R. Frangula* L. 3. Scarce on Slape Moors, between Wiveliscombe and Milverton.

Genista anglica L. 3. Very local on Clean Moor, near Wiveliscombe.

Trifolium medium L. 2. Stogumber.

Vicia tetrasperma Moench. 2. Stogumber.

Rubus pulcherrimus Neuman. 4. Chard. — *R. leucostachys* Sm. 3. Wiveliscombe.—*R. Drejeri* G. Jensen. 3. Bathealton.—

R. hostilis Muell. and Wirtg. 2. This very pretty and distinct species is plentiful by the stream in Cockercombe, near Over Stowey. Though not recorded for Somerset, it was found, years ago, by Mr. S. H. Thompson on the Quantocks; as I am informed by Rev. W. Moyle Rogers, who named my specimens.

Geum rivale L. 3. Slape Moors.

Alchemilla minor Huds. (*filicaulis* Buser, *pro parte*). 3. Meadows near Wiveliscombe.

Rosa micrantha Sm. 2. Between Dunster and Timberscombe. 3. Near Wiveliscombe.

Pyrus torminalis L. 3. Copse, Stoke St. Mary.

Sambucus Ebulus L. 3. East side of Pickeridge, near Corfe, in plenty, *W. D. Miller*; hedgerow, Badger Street.

Viburnum Opulus L. 3. Stoke St. Mary.

Valeriana dioica L. 3. Moors near Wiveliscombe and Milverton; locally plentiful.

Dipsacus pilosus L. 3. Milverton.

Eupatorium cannabinum L. 3. One plant with white flowers was found by a streamlet near Bathealton; I have not seen this elsewhere.

Gnaphalium uliginosum L. 3. Near Maunsel, North Newton; near Bathealton.

Inula squarrosa Bernh. (*Conyza* DC.). 2. Stogumber.

Carlina vulgaris L. 3. Badger Street. 4. Staple Fitzpaine.

Hieracium boreale Fr. 1. Near Exton (Exe valley).

Wahlenbergia hederacea Reichb. 2. Boggy ground, between Dunster and Timberscombe.

Lysimachia Nummularia L. 3. Wiveliscombe.

Anagallis tenella L. 2. Between Dunster and Timberscombe.

Samolus Valerandi L. 3. Clean Moor, in ditches.

Menyanthes trifoliata L. 3. Slape Moors, at one spot, where it flowered freely.

Myosotis cespitosa Schultz. 2. Dunster. 3. Near Wiveliscombe. — *M. repens* G. & D. Don. 1. Exton; Winsford. 2. Cockercombe.—*M. versicolor* Sm. 1. Winsford.

Lithospermum officinale L. 3. Copse, Stoke St. Mary.

Echium vulgare L. 3. Gotton Down, West Monkton, *W. D. Miller*.

Verbascum Thapsus L. 3. Wiveliscombe.

Mimulus moschatus Douglas. 2. Mr. H. Corder informs me that this is naturalised at the head of Holford Glen.

Sibthorpia europæa L. 2. Near Dunster, *Miss G. Lister*!

Euphrasia Rostkoviana Hayne. 3. Wiveliscombe.—*E. curta* Wettst. var. *glabrescens* Wettst. 3. Bathealton. — *E. nemorosa* H. Mart. 3. Wiveliscombe.

Bartsia Odontites Huds. var. *serotina* (Dumort.). 3. Milverton.

Pedicularis sylvatica L. 3. Not uncommon about Wiveliscombe, on the drier moors.

Mentha aquatica × *arvensis* (*sativa* L.). 2. Near the Inn, Triscombe.

Scutellaria minor Huds. 2. Cockercombe.

Lamium Galeobdolon Crantz. 3. Wiveliscombe; Buncombe Wood, near Kingston.

Chenopodium rubrum L. 2. Farmyard near Dunster Station, with *C. murale* L.

Atriplex deltoidea Bab. 2. Minehead; pointed out to me by Dr. C. E. Moss.

Salicornia europæa L. (*annua* Sm.), forma **patula* Moss. 2. Minehead. This is the plant recorded in last year's notes as *S. ramosissima*; perhaps owing to the peculiar conditions (being flooded only by unusually high tides), it often simulates that species, in this station, but is distinguishable by its obtuse and stouter branches, &c. I think that my no. 3138, a small state, from a muddy ditch on the Dunster side of Blue Anchor (Oct. 20th, 1906), must also be placed here; Dr. Moss and I found that the great gale of December, 1910, had buried the locality under tons of soil, and killed out the plant.—**S. prostrata* Pallas. 2. Minehead; apparently a new British record, though a specimen which I gathered on the shore of Poole Harbour, near Hamworthy, Dorset, on Sept. 14th, 1891, seems to be this, in a more typical form. Recorded and distributed last year as *S. appressa* Dumort., though after much hesitation (my no. 3546); but Dr. Moss and I paid a special visit to Minehead on Oct. 7th, 1911, and could find no true *S. appressa* there. This is a stouter form of *S. prostrata* than he had previously seen. Only three species were observed here, including *S. Smithiana* Moss, to which my nos. 3548 and 3549 (a remarkably large, stiff-growing, quite prostrate form or state) are referable; but a great many intermediate plants grew with them, which I firmly believe to be hybrids; thus my no. 3547 (October, 1910) is almost certainly *S. europæa*, forma *patula* × *prostrata*.

Polygonum Bistorta L. 1. Plentiful in a meadow by the Exe, below Bridgetown, in Exton parish.

Ulmus scabra Mill. (*montana* Stokes). 3. Wiveliscombe.

Betula pubescens Ehrh. 2. Hills between Dunster and Timberscombe; clearly indigenous. 3. Western border of Buncombe Wood. I omitted to take specimens, and cannot say confidently whether or no these are the type; but I think that the plants of the Dunster district were that, those which I examined being decidedly hairy.

Populus tremula L. 3. Near Croford Bridge, between Milverton and Wiveliscombe.

Spiranthes spiralis Koch (*autumnalis* Rich.). 3. Pasture, between Wiveliscombe and Bathealton, in plenty.

Helleborine longifolia Britten & Rendle (*Epipactis palustris* Crantz). 3. Locally abundant on the wetter part of Clean Moor.

**Orchis incarnata* L. 3. Clean Moor, in good quantity: the true Linnean plant, with bright green, concolorous leaves, distinctly hooded at the tip (rather narrow, in this station); up to fifteen inches high; spike rather narrow, oblong; flowers rather small, the lateral lobes of the crimson-spotted labellum mostly reflexed, varying from flesh-coloured to carmine, with some admixture of white, but drying a somewhat dark purple, even with great care and frequent changes. I had not previously seen this in the county; Murray quotes three stations for the species in N. Somerset (dist. 8, 9), but "gives the localities with much hesitation." It was associated with a fair amount of *O. maculata* L., which I have rarely observed in *peaty* bogs, and with *O. ericetorum* Linton, which is frequent about Wiveliscombe; I could not detect any hybrids, but many of the plants were only in bud when I found them, on June 2nd.

**Allium oleraceum* L. 4. Very sparingly on the bank of a by-road, south-west of Staple Fitzpaine; probably native, as it was not near houses.

**Scilla campanulata* Aiton (*Endymion campanulatus* Parl.). 3. This pretty plant, which does not seem to have been previously found naturalised in England, was detected and named by Mr. James Britten, while we were strolling together on May 17th past a hill-copse at Stoke St. Mary; it was in fair quantity over quite a small area, associated with *Melissa officinalis* and a dark-red garden form of *Aquilegia vulgaris*, and must have been there for a considerable time. Many flower-spikes had evidently been already gathered; I hope to get a supply for distribution this year.

**Juncus compressus* Jacq. 3. Sparingly by the roadside at Manworthy, near Wiveliscombe; probably further investigation would prove its occurrence in a less artificial habitat, somewhere near, as it is an unlikely species to be introduced.

Sparganium neglectum Beeby. 3. Moist meadow, just above Green Mill, Bathealton.

**Wolffia arrhiza* Wimm. 3. This, the most interesting addition to the Somerset Flora in recent years, was brought to me fresh in June, 1911, by Mr. W. Watson, a master at Taunton School, who has contributed notes on Somerset Cryptogams to this Journal; he found it in a pool near the Great Western Railway, a little to the east of Taunton, and only just outside my own parish of West Monkton, associated with *Lemna polyrrhiza* L. Until quite lately W. Sussex was its ascertained western limit in this country; but Professor Trow, in his *Flora of Glamorgan*, p. 160 (1911), gives two stations for v.-c. 41. It does not appear to have flowered during the exceptionally favourable summer of last year.

Scirpus pauciflorus Lightf. 3. Locally plentiful in bare, wet, muddy places on Clean Moor.—*S. sylvaticus* L. 3. Bathealton; Slape Moors.

Eriophorum angustifolium Roth. 3. Common on the moors near Wiveliscombe.—*E. latifolium* Hoppe. 3. Abundant and fine on Slape Moor.

Cladium Mariscus Br. 3. A very careful search has failed to yield this in any other station near Wiveliscombe than that on Holme Moor, recorded last year.

Carex pulicaris L. 3. Moors near Wiveliscombe; frequent.—*C. echinata* Murr. (*stellulata* Good.). 1. Winsford.—*C. pilulifera* L. 2. On the hills between Dunster and Timberscombe.—*C. panicea* L. 3. Plentiful on the moors near Wiveliscombe.—*C.*

pendula Huds. 3. One fine plant, a little below Holme Moor, towards Croford Bridge. This species is decidedly scarce on the lighter soils, although remarkably abundant in many parts of Somerset on heavy land. — *C. helodes* Link (*lævigata* Sm.). 2. Very luxuriant in a small swamp between Dunster and Timberscombe.—*C. binervis* Sm. 2. Frequent on the hills near Dunster. —*C. fulva* Host (*Hornschuchiana* Hoppe). 3. Common on Clean Moor and other bogs near Wiveliscombe; the hybrid with *C. Œderi* Retz. var. *œdocarpa* Anderss. occurs on Clean Moor, with the parents—as usual, quite sterile. — *C. acutiformis* Ehrh. (*paludosa* Good.). 3. Between Wiveliscombe and Bathealton.

Milium effusum L. 3. Near Wiveliscombe.

Calamagrostis epigeios Roth. 3. Abundant on the Lias, near Badger Street. 4. Hedge-banks, east of Staple Fitzpaine.

Molinia cœrulea Moench. 3. Moors near Wiveliscombe; common.

Glyceria declinata Bréb. 2. Dunster. 3. About Wiveliscombe and Bathealton.

Festuca pratensis Huds. 4. Chard Reservoir.—*F. elatior* L. 3. Near Wiveliscombe. 4. Chard Reservoir.

Polystichum angulare Presl. 2. Stogumber.

Lastræa montana Moore (*Oreopteris* Presl). 2. Croydon Hill, near Dunster; Cockercombe.

Equisetum maximum Lam. 3. Badger Street.—*E. palustre* L. 3. Wiveliscombe.

WHAT IS *ASTRAGALUS HYPOGLOTTIS* L.?

By C. C. Lacaita, F.L.S.

Undoubtedly it is the species subsequently named by Lamarck *Astragalus purpureus*, as already pointed out by Mr. N. E. Brown in Eng. Bot. ed. 3, Suppl. p. 65 (1892), under *A. danicus* Retz., and not *A. danicus* as supposed by Sibthorp, Fl. Oxon. p. 227 (1794), by Smith in Eng. Bot. t. 274 (1795), by De Candolle, Astrag. p. 118 (1802), and Prodr. ii. p. 281 (1825), and by Bunge, Astrag. p. 83 (1868), nor *A. asperulus* Duf. = *A. epiglottoides* Willk. as proposed by Lange. But as Mr. Brown bases his conclusion on a certain specimen in the Linnean herbarium which he assumes, without discussion, to be "Linnæus's type specimen of *A. hypoglottis*," and does not allude to the difficulties that had previously been raised by Bunge and by Lange to this identification, and to the recognition of the specimen in question as representing Linnæus's type, it seems desirable to attempt a more complete proof of his assertion, which unfortunately can only be done by entering into considerable detail.

The wrong road was first taken by the English botanists Sibthorp and Sir J. E. Smith. They both knew the specimen in Herb. Linn. relied on by N. E. Brown; they both considered it to be Linnæus's type of *A. hypoglottis*, but they both fell into the error of supposing this specimen to be identical with the British

Astragalus described by Ray, Hist. p. 939, as *Glaux montana purpurea nostra*, where he quotes for it several localities in Cambridgeshire. This is clear from what Smith says in Eng. Bot. *loc. cit.*: "By the synonyms . . . . it [the British plant] seems to have been much misunderstood, which arose from Linnæus referring Ray's figure and description to his *arenarius* . . . Linnæus afterwards strangely confounded it with *epiglottis* [this is not the case; Linnæus confused *epiglottis* with his *hypoglottis*, but not with the British plant; see below], but at length atoned for all by his excellent description in the *Mantissa altera*, where he first gives it as a new species by the name of *hypoglottis*, which Dr. Sibthorp learned from the Linnean herbarium."

But the British plant is *A. danicus* Retz. and is rightly referred to that species by Stokes in Withering Arrangt. ed. 2, p. 787 (1787), whilst the specimen in question is *A. purpureus*. There is no specimen of *A. danicus* in the Linnean herbarium; none of *A. purpureus* but seven of *A. danicus* in Smith's. Evidently neither Sibthorp nor Smith were really acquainted with *A. purpureus* or noticed that the specimen in Herb. Linn. differ from the British plant.

De Candolle not unnaturally followed the authority of the English botanist who was in touch with Linnæus's herbarium, and after him it became the received opinion that *A. hypoglottis* L. = *A. danicus* Retz.

The first note of suspicion had already been sounded by Robert Brown in a paper on "The Botanical History of Angus" read before the Edinburgh Natural History Society on Jan. 26th, 1792, but first printed in this Journal for 1871, pp. 321–327. Brown there doubts the applicability of Linnæus's description to the British plant, but he also objects to an identification of this plant with *A. danicus* because he wrongly supposes Retzius's species to be annual. His remarks, therefore, do not assist either view, and his own idea that the Angus plant is a new species may be disregarded.

It was really Lange who refuted the prevailing view that *A. hypoglottis* = *A. danicus*. This he had done twice successfully before that view was revived by Bunge. Lange's opinion is of exceptional importance on account of his intimate acquaintance with the living plants both of Denmark and of Spain.

In the second edition of his *Haandbog i den Danske Flora*, p. 470 (1856–1859), he says: "The hitherto general opinion that *A. danicus* Retz. is synonymous with *A. hypoglottis* L. I cannot agree with. The Linnean *A. hypoglottis* is described thus: 'legum. replicatis, compressis, acumine reflexo,' and is said to be like *A. pentaglottis*, which does not at all suit our plant. Moreover, *A. hypoglottis* is stated to be from Spain, but *A. danicus* appears to grow in England, Denmark, and isolated districts of Germany, to be wanting in France,* and from all the data known to me, is not found in Spain. If, therefore, this plant was not unknown to Linnæus, it may be that it was included by him under *A. arenarius*, as he indicates this from England, where it is not found, and cites as a synonym, Raj. Angl. tab. 12, f. 3, which, without doubt, absolutely represents *A. danicus*." Again in his *Pugillus*, p. 373 (1865), he repeats, more forcibly still, the objections to the identification with *A. danicus*, but makes no attempt to determine what species *A. hypoglottis* L. really is.

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* Corrected to "Western France" in the 1888 edition of the *Haandbog*. It is plentiful in the French Alps.

Notwithstanding this, Bunge (*loc. cit.*), without any allusion to Lange's argument, returned in 1868 to the old idea, because he believed, wrongly, as will be shown further on, that he had found Linnæus's type, not in Herb. Linn., but in a specimen from the Cliffort's herbarium at the British Museum, which specimen is undoubtedly *A. danicus*. The synonymy Bunge gives is: "*A. hypoglottis* L. herb. Cliffort., DC. Astr. p. 94, n. 18, tab. 14. excl. descr. leguminis. Syn. *A. arenarius* Pall. Astr. p. 43, n. 46, tab. 34, optima! *A. danicus* Retz. Obs. Bot. 3, p. 41." Then on p. 84:—"Hæc species in herbario Cliffortiano, nunc Mus. Brit. manu Linnæi nomine '*A. hypoglottis*' designata, est ipsissima; 'Glaux exigua montana purpurea nostra Raj.' ex herb. Vaill., et nomen servare debet, quamvis ab ipso herb. Linneano alia species sub falso nomine asservatur. In errorem duxit enim assertio Candolleana leguminis loculos esse monospermos. In herb. Candolleano enim sub nomine *A. hypoglottidis* in eodem folio plures congestæ species; (1) *A. hypoglottis* verus, cui etiam adscriptum nomen *A. danicus*; (2) *A. pentaglottis*; (3) *A. Glaux*; (4) *A. viciæfolius*."

It is to be regretted that Bunge's observations on Linnean specimens which he inspected are not reliable. In Dr. Pampanini's exhaustive paper on *A. alopecuroides* L. (N. Giorn. Bot. It. n. s. xiv. 327–481 (1907)), it is pointed out that a plant so labelled in the Linnean herbarium, which Bunge declared to be the true *A. alopecuroides*, is obviously *A. narbonensis*, a species well-known to Bunge, and easily distinguishable, owing to its having a different number of bracts to the flowers.

Bunge's statements brought Lange into the field again in a paper, "Bidrag til Synonymiken for nogle kritiske Arter fra Danmarks og Nabolandenes Floraer," in Oversigt K. Dansk. Vidensk. Selsk. Forhandl. for 1873, pp. 126–144, with two plates, a French translation of which* is printed in the Résumé du Bull. Ac. Roy. Dan. for the same year (pp. 45–56). Lange there accepts Bunge's erroneous statement about the specimen from Hort. Cliff., having no clue to lead him to suspect its accuracy, and devotes himself to pointing out that there might have been a confusion of labels, and to emphasising the greater importance of the description, and its absolute incompatibility with *A. danicus*. Observing, however, that Bunge alludes to another specimen—the one in Herb. Linn.—as a "different species," there bearing "a false name," he requested Trimen to examine the specimens of

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* "Sur la synonymie de quelques espèces des flores du Danemark et des pays voisins."

Astragalus in the Linnean herbarium. Trimen replied that "he could find no specimen labelled by Linnæus with the name *A. hypoglottis*, but a specimen of *A. purpureus*, designated '*epiglottis*,' by Linnæus, to which Sir J. E. Smith had added '*hypoglottis* L.'" Trimen's reply was perfectly correct, as far as it goes, but there is a good deal more to be said. The specimen alluded to is, of course, the one assumed by Mr. N. E. Brown to be Linnæus's type. Our task now is to show why he is right, and Bunge and the others wrong, when neither of the specimens on which they respectively rely was ever labelled "*hypoglottis*" by Linnæus at all! It is, therefore, inevitable to compare in detail Linnæus's successive descriptions of this and the most nearly allied species with the synonyms he cites, and with the specimens in his herbarium and that of the *Hortus Cliffortianus*.

Linnæus in his earlier writings, and in his herbarium, undoubtedly confused *Astragalus epiglottis* with *A. pentaglottis*, with *A. purpureus*, and with *A. Glaux*, but not with *A. danicus*, Ray's two synonyms for which he assigned to *A. arenarius*. The cause of the confusion seems to have been his not infrequent juxtaposition, as synonyms, of names from earlier authors, which really belonged to different species.

Thus in Hort. Cliff. p. 362, we find as *Astragalus* No. 4: "A. siliquis cordatis acutis pendulis lateribus connibentibus" (*sic*), a diagnosis which unquestionably belongs to *A. epiglottis* L. Mant. p. 274 (non Sp. Pl.). The habitat is "Crescit in Hispania" and the six following synonyms are cited:—

(1) "Astragalus pumilus, siliqua epiglottidis forma. Tournef. Inst. 416, Boerh. Lugdb. 2, p. 54." This is certainly *A. epiglottis*.

(2) "Astragalus hispanicus, siliqua epiglottidi simili, flore albo minore tournefortii. Herm. Lugdb. 76, t. 77." This also, both from the wording and from the figure, is certainly *A. epiglottis*.

(3) "Glaux hispanica. Sloanei. Raj. hist. 940." This is certainly *A. pentaglottis*. Ray says: "In planta sicca ad nos à D. Sloane transmissa . . . siliquæ breves et velut triangulæ . . . exterius musco quodam subruffo denso innascente scabræ . . . præter muscum villosum siliquæ etiam lanugine pubescunt."

(4) α "Astragalus supinus, siliquis villosis glomeratis. Tournef. Inst. 416" [417]. On reference to Tournefort, *loc. cit.*, this will be found to be identical with the next synonym. It therefore is also *A. pentaglottis*, although the phrase would apply as well to *A. purpureus*.

(5) "Astragalus hispanicus, siliqua epiglottidi simili, flore purpureo, major tournefortii. Herm. Lugdb. 74, t. 75." From Hermann's figure this is certainly *A. pentaglottis*, to which it is subsequently referred by Linnæus himself in Mant. p. 274.

(6) "Astragaloides incana, flore purpureo, lentis siliquis. Barr. rar. t. 537, f. 1." This seems to be *A. pentaglottis*, to which it is referred by Linnæus in Mant. *loc. cit.* But the figure is inferior to most of those of Barrelier. The text at p. 76, No. 850, quotes Tournefort's "A. supinus siliquis villosis glomeratis," but the remark "Planta pusilla, vix medio palmo altior" rather suggests

A. epiglottis, which, however, is incompatible with either the figure or the diagnosis.

In the *Species Plantarum* ed. i. p. 759, the diagnosis of *Astragalus* No. 4 of Hort. Cliff. reappears as a first synonym of *A. epiglottis*, now described as "A. caulescens procumbens, leguminibus capitatis cordatis acutis reflexis, complicatis . . . Habitat in Hispania," with the fifth and sixth synonyms as quoted above. This description and the Hort. Cliff. synonym can only apply to *A. epiglottis*, the two other synonyms only apply to *A. pentaglottis*. In Linnæus's own interleaved copy in the possession of the Linnean Society, the word "*reflexis*" is struck out and replaced by "*hirsutis*" in his own hand. This alteration indicates that the legumes of *A. purpureus* and not those of *A. epiglottis* or of *A. pentaglottis* were now being aimed at. There is also an addition of "Galloprovincia, Oriente" to the habitat. These alterations were embodied in the second edition of the *Species Plantarum* (1763), p. 1069, which, with this exception, reproduces the exact words of the first.

In Syst. Nat. x. p. 1174 (1759), xi. p. 1174 (1760), and xii. p. 499 (not 199, as misprinted in the *Mantissa*), we find *A. epiglottis* with the diagnosis repeated exactly as in Sp. Pl. ed. ii., but with all synonyms omitted.

Although it was not till the *Mantissa altera* of 1771 that Linnæus separated the three species *hypoglottis*, *pentaglottis*, and *epiglottis*, he had already become aware of the confusion, and prepared the ground for the separation in his MS. notes in the interleaved copy of ed. 2 of the *Species Plantarum*, also in the possession of the Linnean Society. There, at p. 1069, the word "*hirsutis*," which had crept into the diagnosis of the legumes of *A. epiglottis*, is struck out again, thus clearing away an expression that probably refers to *A. hypoglottis*; for "siliqua epiglottidi simili, flore purpureo major, Herm. 74, t. 75" is substituted "siliqua epiglottidi simili, flore albo, minor, Herm. 76, t. 77"; so eliminating *A. pentaglottis*. To the synonyms is added "*Glaux minima* Riv. tetr." The figure of "*Glaux minima*" in Rivinus, Icones Plant. Fl. Irreg. Tetrapetalo,* is an excellent representation of *A. epiglottis*, whilst the lower figure of the same plate, "*Glaux hispanica*," is an equally good one of *A. pentaglottis*. To the habitat are added the words "*sylvis montosis*" but they are immediately preceded by the erased words "*sterilibus apricis*," which, of course, would have been the correct description of the haunts of *A. epiglottis*. The erasion and substitution may have been a slip of the pen, or may point to a confusion with the habitat of *A. purpureus*. More important is the substitution of the sign for "perennial" instead of that for "annual." This is incorrect for *epiglottis*, though correct for *hypoglottis*. So the confusion does not seem to have been completely cleared up yet. On the interleaf there is a fresh diagnosis of *A. epiglottis*, worded rather differently from that of the *Mantissa*. It runs as follows:—

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* The plates are not numbered.

"Caules plures undique procumbentes depressi, digiti longitudine. Foliola pinnata, foliolis 11 s. 13 lanceolatis, vix manifeste pubescentibus, acutis. Capitula florum axillaria, subsessilia. Legumina, sæpius 8, ovata s. cordata, depressa, deorsum parum complicata, acuta, incana, apice adscendentia, cernua, rigido pedicello."

At last we reach the *Mantissa altera*, where, on p. 274, *A. pentaglottis* is defined as "A. caulescens procumbens, leguminibus capitatis replicatis compressis conniventibus cristatis acumine reflexo," with a reference to Herm. tab. 75, and to the "*Glaux hispanica*" of Rivinus. "Habitat in Hispania."

A. epiglottis is defined as "A. caulescens procumbens, leguminibus capitatis sessilibus cernuis cordatis mucronatis replicatis nudis," with the synonyms "Astragalus siliquis cordatis acutis pendulis, lateribus conniventibus. Hort. Cliff. 362." "A. hispanicus, siliqua epiglottidi simili, flore albo minor. Herm. Lugdb. 76, t. 77," and "*Glaux minima* Riv." "Habitat in Orientis, Hispaniæ, Galloprovinciæ sylvis montosis. *Exclusus in Sp. Pl.* 1069 *ita restituatur*. Corollæ albæ."

Then *A. hypoglottis*. "Astragalus caulescens prostratus, leguminibus capitatis ovatis replicatis compressis pilosis acumine reflexo.—Astragalus epiglottis Syst. Nat. 12, p. 199 [499] *exclusis synonymis.*—Astragalus villosus procumbens, floribus pallide purpureis oblongis. Raj. App. 454 [455]. Habitat in Hispania. Similitudinem gerit cum A. pentaglotto, sed magis caulescens. Capitula pedunculata pedunculo similiter elongato; Flores plures ad 8 s. 10, in capitulo rotundato more trifolii, cærulei aut purpurascentes. Legumina replicata, ovata (non subulata), acumine duplici (in maturis), subulato, recurvo; tecta pilis (non squamis furfuraceis) longis, albis, mollibus, minime autem in orbem expansis quemadmodum in A. stella, neque subulata ut in A. sesameo."

The new synonym here introduced from Ray's appendix is too uncertain to give any help. Ray, after the diagnosis,* says, "Siliqua uncialis est, et longior, bicapsularis, rotunda, magnitudine Loti hæmorrhoidalis (*i. e.* Dorycnii hirsuti) in acumen desinens. Ex horto Amsterod. a Breynio missus." I have no notion what Ray's plant can be. It does not fit any of the species which have been suggested for *A. hypoglottis*. The legumes of *Dorycnium hirsutum* are far from being "*unciales*," but they do not differ much in size from those of *Astragalus purpureus*, which has distinctly larger legumes than *A. danicus*, and much larger ones than *A. asperulus* Duf. or *A. epiglottis*.

We must now consider the herbarium specimens in the light of what has been said. These are seven in number; five in Linnæus's own herbarium, and two in that of the *Hortus Cliffortianus*.

(1) A specimen from the *Hortus Cliffortianus* of true *A. epiglottis*, labelled thus:—

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* Ray attributes this diagnosis to Sherard, but it is not to be found among the *Astragali* in Sherard's *Schola Botanica*.

Astragalus
pumilus, sili-
qua epiglotti-
dis forma.

epiglottis.

The word "*epiglottis*" is written in different, apparently more recent, ink, and in a different hand from the rest of the label. Both are handwritings which occur frequently in the Cliffort herbarium. Their identity is not known, but neither of them is that of Linnæus.

(2) The next specimen, also from the *Hortus Cliffortianus*, is the one relied on by Bunge to prove that *A. hypoglottis* is *A. danicus*, and unquestionably this specimen is *A. danicus* as he states. But he fell into the error of supposing that the name "*hypoglottis*" on the sheet to which the specimen is attached was written by Linnæus. The label is precisely as follows:—

Astragalus
repens minor, flore
cæruleo, siliqua Epi-
glottidi simili.

hypoglottis.

As in the case of (1), the word "*hypoglottis*" is written in a different, apparently more recent, ink, and in a different hand from the rest of the label. *Neither hand is that of Linnæus*!

This disposes of Bunge's statement. Nevertheless, it might be supposed, for other reasons, that this is the type of *A. hypoglottis.* If, for instance, the diagnosis on the label had been one quoted by Linnæus as a synonym of *A. hypoglottis*, or even if it corresponded with one of the diagnoses of *Astragali* in Hort. Cliff., or were quoted there as a synonym of some species which could be plausibly maintained to include, in confusion with other species, the plant afterwards named *hypoglottis.* But the expression "Astragalus repens minor, flore cæruleo, siliqua Epiglottidi simili" is not found at all in the *Hortus Cliffortianus* nor anywhere else in Linnæus's works, nor have I as yet been able to trace it in any earlier author.

The real interest of this specimen lies in the proof it affords that *A. danicus* was grown in Cliffort's garden, and was therefore almost certainly known to Linnæus in his earlier life. Indeed, Lange's supposition, that perhaps Linnæus had never seen this species, is a most improbable one. Why Linnæus did not publish this diagnosis in the *Hortus Cliffortianus* must remain a mystery.

That he, not having published it there, should not allude to it in any of his later works, is less surprising, for it must be remembered that when he left Holland he was separated from Cliffort's herbarium, and possibly—indeed probably—never saw this specimen again. There are other instances of his having at the date of the *Species Plantarum* forgotten the contents of Cliffort's garden and herbarium in cases where those contents had not been published in the volume of the *Hortus Cliffortianus*. For example, Cliffort's herbarium contains a fine specimen of Trionfetti's "*Carduus pycnopolycephalus palustris*" with the plumose pappus of a *Cirsium*, whereas the specimen in Herb. Linn. of *Carduus polyanthemus*, to which Trionfetti's plant is referred in the *Mantissa*, is a true *Carduus* with simple pappus, grown at Upsala, and is in fact *C. multiflorus* Gaud.

The remaining five specimens are all in Linnæus's herbarium, and are all marked "*epiglottis*" in his own hand.

(3) From Gouan, and so marked by Linnæus himself. It is certainly *A. pentaglottis*, and the name has been altered to *pentaglottis* by Sir J. E. Smith. The unmistakable legumes are well represented.

(4) A specimen marked by Linnæus "A. 107. C." The meaning of this indication is not known. Dr. Daydon Jackson, who has recently discovered the clue to several of these Linnean marks, is unable to explain it. The sheet to which it is attached is pinned to an upper sheet bearing a piece of *A. Glaux* sent from Spain by Loefling. Although marked "*epiglottis*" it is certainly *Glaux*, like the plant on the upper sheet.

(5) Absolutely typical *epiglottis* grown in Hort. Upsalensis. Smith as well as Linnæus has duly marked this "*epiglottis*." I suspect that this specimen was added to the herbarium after the publication of the second edition of the *Species Plantarum*, and it may have been the warning which caused Linnæus to correct in the *Mantissa* his account of *A. epiglottis*.

(6) A specimen on a sheet pinned underneath that of the next specimen (no. 7). It is so poor a specimen that I dare not determine it. There is a sessile head of two or three largish upright glabrous legumes, rather like those of *A. bæticus*. At any rate, it has nothing to do with the species we are considering.

(7) The true type of *A. hypoglottis*. It is a plant sent by Gérard, marked (by him) N. 28, and named "*epiglottis*" in Linnæus's handwriting, but corrected in pencil by Smith as follows: "*Hypoglottis*, vide descr. optimam in *Mantissa*, 274. J. E. S."

It is obviously *A. purpureus*, and is the specimen alluded to by Bunge and Trimen, and correctly assumed by N. E. Brown to be Linnæus's type of *A. hypoglottis*. It consists of two pieces which may or may not be portions of one plant. Neither shows anything of the root, and it could not be gathered from them whether the plant is annual or perennial. The left-hand piece has a head of about five flowers, the one on the right a head of eight or nine well-developed legumes.

But if this be indeed the type of *A. hypoglottis*, why has Linnæus marked it "*epiglottis*"? The reply is obvious if, as seems reasonably probable, this plant was in his herbarium before he wrote the *Mantissa altera*. Until the publication of *A. hypoglottis* in that work, and its clear separation from *A. epiglottis*, this specimen of *A. purpureus* was *A. epiglottis* pro parte, and he could not have assigned it to any other species that he had up till then recognized. In fact, in Mant. p. 274, he says quite clearly that *A. hypoglottis* is the *A. epiglottis* of Syst. Nat. (exclusis synonymis); that is to say, he there declares it to be this very plant. That he did not, after publishing *A. hypoglottis*, alter the name of this specimen from *epiglottis* to *hypoglottis* does not throw doubt on its being really *hypoglottis*; because in exactly the same way he has not altered the name of specimen no. 3 from *epiglottis* to *pentaglottis*, though it is indisputably the latter species. It must, however, be admitted that Smith's opinion that this specimen represents *A. hypoglottis* gives us no assistance, because, as already explained, he was blind to the difference between *A. danicus* and *A. purpureus*.

So far, therefore, *A. purpureus* holds the field, and *A. danicus* has no claim to represent *A. hypoglottis*. But the later views of Lange in the Bull. Ac. Roy. Dan. for 1873 (*loc. cit.*) demand consideration. In his paper in that publication,* the proposition that *hypoglottis* = *danicus* is again refuted—for the third time by Lange—at great length. His objections fall under four heads:—

(1) *Linnæus's diagnosis does not correspond with danicus.* Indeed, it does not altogether fit, but the objections on this ground are not quite so strong as Lange seems to think. As they apply equally to *purpureus*, I reserve discussion of them till we come to that species.

(2) *Linnæus describes hypoglottis as annual*, whereas *danicus* is very obviously perennial, and "unless there are peculiar circumstances one cannot suppose that Linnæus could have deceived himself as to this character." There are peculiar circumstances, as will be pointed out under *A. purpureus*.

(3) *The reference by Linnæus of Ray's synonym† and that of Plukenet for the British A. danicus to arenarius and not to hypoglottis.* This is a very strong argument, and is really conclusive by itself against the *hypoglottis* = *danicus* theory. It is reinforced by the fact that the synonyms quoted for *hypoglottis*, i.e. *A. epiglottis* Syst. Nat. and *A. villosus procumbens*, &c., of Ray, Appx. p. 455, give no support to that theory. It is strange that Lange was not able to find these last words of Ray in that author's writings; so he says on p. 49, but the words are there.

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* References are to the French version, but the plates only accompany the Danish original.

† The phrase "Glaux montana purpurea nostras" is due to Ray, Hist. p. 939 (1686), but its synonym, "Astragalus incanus parvus purpureus nostras," is Plukenet's, in Alm. p. 59 (1696). Ray, however, in the third edition of Syn. Stirp. Brit. p. 376 (1702), adopts Plukenet's name, adding his own as a synonym.

(4) "*Habitat in Hispania.*" This is absolutely conclusive against *danicus.*

In Lange's words (p. 52) we are perfectly justified

(*a*) in rejecting the use made by Sibthorp, Aiton, Smith, DC., &c., of the name *hypoglottis*;

(*b*) in excluding from *A. arenarius* of Linnæus the English synonyms and their localities, and applying to them the name of *A. danicus* = *A. hypoglottis* DC. non L.;

(*c*) in searching for a Spanish species to which the Linnean characters of *A. hypoglottis* apply.

In other words, *hypoglottis* must be a plant that grows in Spain. It must also bear a resemblance to *A. pentaglottis.* These two conditions are fulfilled by *A. purpureus.* Lange's own suggestion of *A. asperulus* satisfies the first condition, but the second is absolutely fatal to it.

Of *A. purpureus* Lange speaks as follows, on p. 53:—"The confusion of the names *epiglottis* and *hypoglottis*, united to the circumstance that the specimen in Linnæus's herbarium marked *epiglottis*,* but altered by Smith to *hypoglottis*, belongs to *A. purpureus*, gives some air of truth to the hypothesis that the latter is the true *A. hypoglottis*, all the more that the true *A. epiglottis* differs so much from *A. purpureus* that one cannot suppose that Linnæus confused these two species." † Besides, *A. pupureus* has been found in Spain, so that on that side there would be no objection to this hypothesis. But the characters indicated for *A. hypoglottis*—root annual, stems procumbent, heads with 8–10 flowers, legume recurved like a hook (recourbée en crochet) and bifurcated at the summit—suit *A. purpureus* as little as they do *A. danicus*, wherefore this interpretation of the name is not satisfactory."

Let us examine these five objections:—

(1) The annual root. This is grave if there are no "exceptional circumstances." But when we consider that in the MS. alterations to the second edition of the *Species Plantarum*, already referred to, Linnæus actually altered the sign of *epiglottis* from annual to perennial, and then altered it back to annual in the *Mantissa*, it becomes evident that he was quite capable of an oversight in this respect. Moreover, we have no evidence that he ever cultivated *A. purpureus.* Consequently, he could only know its duration from the appearance of dried specimens. But the specimen in his herbarium shows no root and gives no information about its duration.

(2) The expression "caulescens prostratus," for which Lange substitutes "langstrakte Staengler," "tiges couchées." But why should this conflict with *A. purpureus* any more than the phrase "caulescens procumbens" conflicts with *A. pentaglottis* or with

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* Lange says, "Désigné par DC. comme *epiglottis*," but this is obviously a slip of the pen, as the name on the sheet is in Linnæus's hand, and DC. has nothing to do with it.

† Yet, as seen above, he did confuse them, and *A. pentaglottis* with them till after ed. 2 of Sp. Pl.

A. epiglottis, to both of which it is applied in the *Mantissa*? None of the three are erect plants. The stems in all are ascending; more or less prostrate or erect according to whether the plants grow on bare ground, or among herbage. Only last June I found both *purpureus* and *danicus* plentifully in the neighbourhood of Gap, in Dauphiné. In both species the stems lie about among the grass, and only the flowering-heads show well up above it. I think this objection may be dismissed as cavillous.

(3) Flowers 8–10. No doubt the flowers in each head of *A. purpureus* are normally more numerous. But in the specimen in Herb. Linn., as already mentioned, one of the heads contains about nine flowers, and the other only about five. So that if Linnæus described from the plant actually under his eyes the number he assigns would be quite correct. This objection also may therefore be dismissed.

(4) "Gousse recourbée en crochet"; in the Danish version, "den i Spidsen hagekrummede og toklovede Baelge." Surely this is not a fair translation of Linnæus's words, "Legumina replicata . . . acumine . . . subulato recurvo," and "leguminibus replicatis . . . acumine reflexo." There is not a word that justifies "en crochet." It is not the legumes that are "recurva" or "reflexa," but their styles, their "acumen." The legumes themselves are "replicata," which does not mean reflexed or recurved, but laterally folded in (more or less) upon themselves. It is equivalent to "complicata," only outwards, not inwards. This is clear from the very same word being used of the legumes of *epiglottis* and *pentaglottis*. Linnæus has paraphrased the same idea in the expressions "lateribus conniventibus" and "extrorsum conduplicata" applied to those other two species respectively. For the legumes of *epiglottis*, which, instead of being erect, are pendulous, he has employed the words "cernuis" and "pendulis." In those of *A. purpureus*, the base of the long style is straight, but the upper part of it is flexible, curved, and slightly hooked, in fact, "acumine subulato recurvo."

Smith and Sibthorp saw no difficulty in accepting this account of the legume, both for the British species and for the Linnean specimen of *A. purpureus*, so that it can hardly be an impossible description of the latter.

(5) "Bifurcated at the summit," "gousse bifurquée à son sommet." But here again it is only the style, not the body of the legume, which Linnæus declares to be double when ripe; "acumine duplici in maturis." I have only been able to see very few specimens of *purpureus* with dead ripe legumes, and they seem to have a sort of double beak, though less conspicuously so than in *epiglottis*.

Of these five objections the first and the fifth are the only ones that make any serious difficulty. Surely they are entirely outweighed by the words "Similitudinem gerit cum A. pentaglotto," which suits *purpureus* better than any other species, and by the statement that the legumes are "tecta pilis (non furfuraceis) longis albis mollibus." This will only suit *purpureus* or *danicus*, and *danicus* has already been eliminated for other reasons. The words "non squamis furfuraceis," of course, allude to *A. pentaglottis*. Lange having expressed his objections, for whatever they are worth, to accepting *A. purpureus* as the true *A. hypoglottis*, suggests that a rare Spanish species, *A. asperulus* Duf., would agree better with Linnæus's description. It has to recommend it that: (*a*) It is annual. (*b*) It has small heads of only 8–10 flowers. (*c*) It has a rather conspicuous double beak to the legume when dead ripe. On the other hand: (*a*) It is utterly unlike *A. pentaglottis* in most respects. (*b*) It is a rare plant, unlikely to have been known to Linnæus. (*c*) There is no trace of it either in Linnæus's herbarium or in that of Cliffort. (*d*) The flowers are whitish or very pale lilac. (*ε*) The legume, though pubescent, does not agree at all with the "tecta pilis longis albis mollibus." (*f*) The legume has a triangular or cordate base, as in *A. epiglottis*, so does not agree with "ovata." (*g*) Above all, the legumes are reflexed against the peduncle even more markedly than in *epiglottis*. Those who have not access to good specimens of *asperulus* can see all this in Lange's figure, tab. iv. fig. 1.

Willkomm raises the further objection to *asperulus* that the flowers form a spike. But they seem only to acquire this form in fruit, so that the objection is not a very important one. He says in Prodr. Fl. Hisp. iii. p. 270:—"Capitula a Linnæo globosa et flores purpurascentes vel cærulei dicuntur, quamobrem A. asperulum ad A. hypoglottidem ducere adhuc hæsito. Hanc vero speciem ab A. danico Retz., quacum cl. Bunge et Boissier eam perperam conjunxerunt toto cælo abhorrere, optime demonstravit amiciss. Lange."

Lange also passes in review four other Spanish species, the only ones which could conceivably be supposed by anyone to represent *A. hypoglottis*. Of these he very properly dismisses at once *A. Glaux* and *A. pentaglottis*. Of *A. granatensis* Lange remarks: "This species, from the mountains of Granada, closely allied (to *A. Glaux*) though certainly different from it, does not suit the description of *A. hypoglottis* on account of its flattish heads with numerous flowers."

I have not seen specimens of *A. granatensis*, but the opinion of Lange, its own author, may be accepted as conclusive.

Of the fourth species he says: "Another neighbouring species, from the South of Spain, *A. Bourgæanus* Coss., which resembles *A. purpureus* in habit, and *A. Stella* in the form of its legumes, could perhaps be referred to (*A. hypoglottis*) more plausibly; but as I have seen no specimen of it, I dare not express an opinion."

The description given by Willkomm, Prodr. Fl. Hisp. iii. p. 276, is: "Differt a præcedenti (A. purpureo), cui habitu similis, capitulis floribusque minoribus et præcipue leguminibus estipitatis, cylindrico-trigonis, in mucronem subuncinatum attenuatis, subtus anguste profundeque canaliculatis, adpresse pubescentibus." Habitat: Sierra de Baza, S. Pedro Martyr, in Catalonia, and somewhere, not specified, in the kingdom of Murcia.

I have inspected Bourgeau's original specimens, no. 1144, from the Sierra de Baza, of which there are two sets at Kew. They disagree much more than *A. purpureus* with the Linnean account of *hypoglottis*, principally because the fruiting-head falls short of the leaves, the legumes are only sparingly pubescent, and the resemblance to *A. pentaglottis* is more remote. There is, moreover, a fatal objection to this species, which also applies to *A. granatensis*. There is not a scrap of evidence that Linnæus was acquainted with either; not a trace of them under any name in his herbarium, or in that of Cliffort. It is exceedingly improbable that he should have known them, as both are rarish plants, inhabiting mountain ranges which had not been explored in Linnæus's day.

We may therefore conclude that *Astragalus hypoglottis* L. cannot possibly be either *A. danicus* or *A. asperulus*, and that it almost certainly is *A. purpureus* Lam., because (1) it grows in Spain; (2) it is the species which in flower most nearly resembles *A. pentaglottis*; (3) it tallies fairly, though not perfectly, with the Linnean description; (4) it is represented in the Linnean herbarium by a specimen of *purpureus* labelled "*epiglottis*" by Linnæus himself, a name which, so far as it covers other plants than true *epiglottis*, is replaced in the *Mantissa* by the name *hypoglottis*, so that we may justifiably substitute "*hypoglottis*" for "*epiglottis*" in the label of that specimen.

SHORT NOTES.

POLYGALA VULGARIS L. var. GRANDIFLORA Bab.—"Ben Bulben at 1200 feet, and occasionally on the cliffs of other mountains in Sligo," Barrington and Vowell, Proc. Roy. Irish Acad. iv. No. 4 (1885), p. 502. Dr. Williams, in the new (ninth) part of his *Prodromus* (1912, p. 522), remarks on this: "As a distinct form the status is doubtful. There are only two specimens in the Herb. Mus. Brit."; but these two specimens have absolutely nothing to do with Babington's variety! Babington, in the second edition of his *Manual* (p. 38, 1847), mentions it as under:—"A plant from Ben Bulben, Sligo, which is probably distinct, has the lower leaves oblong and rather small, upper lanceolate and large, wings of the calyx elliptical apiculate, their *lateral nerves rejoining the central one near the apex*, and with numerous anastomosing branches externally, central nerve usually quite simple." In his fourth edition (p. 40, 1856) he adds, "and may be the var. *grandiflora* (W. and G.)." In the seventh (p. 44, 1874) he names it var. *grandiflora* Bab.; and so up to the ninth edition, 1904. Syme, in Eng. Bot., quotes "ed. 5, p. 41"—a slip. But there was already a var. *grandiflora* DC., so that Babington's plant cannot bear that name. That is why Nyman, Consp. Fl. Europ. (1878) p. 83, named it *P. Ballii*, as Ball had named it *P. buxifolia* in his herbarium, a name already occupied. That being so the plant should be named *P. vulgaris* L. var. *Ballii* (Nyman). The Glamorgan plant also does not belong here. The plant has a very distinct habit (I possess beautiful specimens gathered by the late S. A. Stewart, of Belfast): the lower leaves are very like small box-leaves; the flowers are placed very close together, so that in fruit the raceme is very dense, the fruits overlapping each other. A form closely approaching *Ballii*, "very near my var. *grandiflora*" (Bab. in litt.), occurs on the chalk cliffs between the Shrimper's Steps at Dover and Abbott's Cliff and beyond towards Folkestone. The lower leaves are even more coriaceous than those of the Irish plant, and the growth is very like that of *P. calcarea*. Mr. Backhouse, writing in September, 1877, named it "a luxuriant form of *calcarea*"; but when I sent him living specimens he wrote, "Comes under *P. vulgaris*, and certainly is a remarkable form." The lower leaves are oblong, very coriaceous, upper lanceolate 2·5 cm. long, the flowers as large as the Irish plant, and the fruiting sepals similar. Dr. Williams places *P. oxyptera* Reichb. as *β oxyptera* Syme; but surely if named as a variety, it should bear Meyer's name of v. *stenoptera* (Chl. Hann. (1836) p. 175. If regarded as a variety, it should be quoted as of Detharding, Consp. Fl. Meg. (1828) p. 55; other authors prior to Syme are Koch, Syn. Fl. Germ. et Helv. (1843), and Sonder, Fl. Hamburg. (1851).—ARTHUR BENNETT.

TAPHRINA RHIZOPHORA Johanson IN BRITAIN.—Some specimens of *Populus alba*, with female catkins, were sent to me by Miss E. Armitage from Dadnor, Ross, and several of the pistils were seen to be attacked by the above fungus and had become a bright orange yellow. There is no doubt that the species in question is *T. rhizophora* and not the nearly related *T. Johansonii* (Pers.) Sadeb., which differs for one thing by its asci being up to 105 mm. long, whilst those of our species attain a length of 160 mm. Sadebeck makes reference to *T. rhizophora* in his monograph on "Die parasitischen Exoasceen" (*Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten*, x. 2, 1892–93), p. 75, figs. 8–9. According to him this plant is known from Sweden only, and it is not easy to suggest how it was carried over to England. It was actually noticed in April of this year for the first time "on two female trees growing in the Dadnor pleasure-grounds about 100 yards apart. A female *Populus virginiana* close by was not affected."—O. V. DARBISHIRE.

MONTIA.—My herbarium contains specimens of *M. fontana* L. from Shidley Common, Boarstall, v.-c. 26; near Cheltenham, v.-c. 33; near Stanton, v.-c. 34; four localities in Glam., v.-c. 41, varying from 150 to 800 feet above the sea; St. David's Head, v.-c. 45; near Holyhead, v.-c. 52. Of *M. lamprosperma* Cham. (besides Mr. Druce's gathering from Carnarvonshire), from three localities (at sea level, 250 feet and 800 feet) in Glamorganshire, v.-c. 41; and Washburn Valley, v.-c. 64; also var. *boreo-rivularis* Lindb., from the Bwllfa, Aberdare, at 700 feet, v.-c. 41. My gatherings in v.-c. 41 are thus divided equally between the two species. If I understand the nomenclature aright, the type in both cases is represented by the form of drier localities, which, however, can hardly be described as "erect or suberect"; in the majority of cases it makes a low-lying mat on the ground, the stems only ascending, at the most. The seed of our *M. lamprosperma* is certainly smaller than that of *M. fontana* L.; not larger, as the descriptions quoted by Druce (B.E.C. Report, 1908, pp. 330–1) state; it is less in breadth and in thickness. Mr. Druce silently admits this by omitting "larger" in Hayward, p. 39. It seems, then, that we have a slight form of *M. lamprosperma*, and not quite the type, at any rate, as far as my specimens so. Again, sometimes the seed of *M. lamprosperma* is almost as dull black as that of the other species, and the tubercles of *M. fontana* vary on different seeds from the same plant, being much reduced in size. It is clear that there are several intermediate forms—H. J. RIDDELSDELL.

STELLARIA DILLENIANA Moench. (= *S. palustris* Retzius = *S. glauca* Withering). See Journ. Bot. p. 223 (1910); Bot. Exch. Club Rep. for 1910, p. 546 (1911); *New Phytologist*, p. 309 (1911). Three forms (at least) of this species occur on Woodwalton Fen, Huntingdonshire:—(1) a glaucous form with large flowers (*i. e.*, petals about 1½ times as long as the sepals); (2) a green form with large flowers; and (3) a green form with small flowers (*i. e.*, petals about as long as the sepals). In view of the emphasis which has been placed on the time of flowering of the green forms, it is interesting to record that all three of the forms mentioned above were in full flower in this locality on June 5th last. The second form was abundant, the first and third much less common.—C. E. MOSS.

VALERIANELLA ERIOCARPA Desv. IN THE ISLE OF WIGHT.—In the list of Hants plants in Watson's *New Botanists' Guide* (1835) is included "*Fedia eriocarpa*, Isle of Wight, G. E. Smith, MSS." Whether or not the correctness of this record has ever been, or can now be, ascertained, I do not know, but Watson, in the *Cybele Britannica* (1840), says: "The other recorded localities for *Fedia eriocarpa* in Yorkshire and Isle of Wight belong to *F. mixta*." The Yorkshire locality is, I presume, that given in the Supplement to the *New Botanists' Guide*, namely, "Marrick Park near Richmond, J. Ward, sp." There seems to be no other record of the occurrence of the plant in the Isle of Wight, nor in Hampshire. Early in May this year I found it growing in considerable abundance on rough grassy chalk slopes at Carisbrooke Castle. The plants were all small in height, mostly about two inches, and none exceeding four inches, but with widely spreading branches. Fruit was already well formed, though not ripened. If it occurred in this habitat in previous years I cannot account for its not having been noticed, except for the fact of its flowering so early and soon disappearing; and I know no probable cause of its sudden appearance. There can be no doubt that annual plants are likely to be more irregular in their appearance than those that are perennial, and it may be questioned whether many annual plants could survive in the "struggle for existence" if it were not for the more favourable conditions resulting from the presence of man. How far *Valerianella eriocarpa* can be deemed indigenous here, or in any of its localities, is a question which those who have studied the distribution of plants may be able to answer. It was first described and published by Desvaux, in his *Journal de Botanique* (ii. 314, t. 11, f. 2, 1809).—FREDERIC STRATTON.

REVIEWS.

The Flora of Bristol. By JAMES WALTER WHITE, F.L.S., Special Lecturer on Systematic Botany to the University of Bristol. Illustrated with three plates and a map. Bristol: John Wright & Sons, Ltd. London: Simpkin, Marshall, Hamilton, Kent & Co., Ltd. (Copies may be had for a short time of the Author, 18, Woodland Road, Clifton, Bristol. Price 12*s.* 6*d.*) Cloth 8vo, pp. viii, 722. 1912.

THIS charming book has evidently been a true labour of love; for Mr. White, the well-known excellence of whose dried specimens is a sign of the care and thoroughness which distinguish all his work, begins the Preface by saying that it is "the outcome of an ideal hobby, cultivated in the spare moments of a business career. It is not too much to say that my love of botanical pursuits has brought me health, friends, and recreation, and a host of delightful experiences that have amply compensated for the harassing cares of an exacting occupation."

The present work is a greatly enlarged and entirely rewritten successor to the "Flora of the Bristol Coal Field," originally issued (1881, &c.) in the Bristol Naturalists' Society's *Proceedings*, and published as a reprint in 1886. It now appears with a more appropriate title, and with the arms of the city on the cover. The print and paper leave little or nothing to be desired, and the subscribers received their copies at the remarkably cheap rate of ten shillings. Mr. White has been very fortunate in his helpers, among whom the late Mr. David Fry (most accurate of observers), Mr. Cedric Bucknall, Mrs. Gregory, Miss M. A. G. Livett, and, more recently, Miss Ida M. Roper, have been conspicuous; yet such assistance, however fully and freely given, needs that careful revision to which almost every page bears witness, and for which the author's Continental explorations have well qualified him. He justly claims that "no pains have been spared in sifting and verifying the enormous mass of alleged facts that have been reported during the extended length of preparation. Every scrap of promising information that lay outside the writer's personal knowledge has been investigated, often at the cost of a day's excursion to some outlying hamlet, and at the risk of offence to kindly correspondents whose unsupported statements could not be accepted." He has, moreover, the saving grace of humour, which redeems his work from any suspicion of dulness; the notes, though often fairly long, are hardly ever redundant, and (as he lately wrote to the reviewer):—"Unable, or at least unwilling, to tackle the more difficult problems *seriously*, I have treated them from the lightest point of view perceptible." This characteristically modest estimate of his own critical ability is by no means confirmed by the results achieved; but he does occasionally "chaff" his *confrères* with a delicate irony which leaves no wound.

The tract of country described is thirty-six miles long, varying in breadth from six miles in its extreme north to thirty miles on its southern boundary; Bristol being as nearly as possible the central point. Few districts of the same size, in Britain or elsewhere, can be so interesting; for it combines the features of coast, estuary, rivers, brooks, vale and hill, together with an unusual variety of soil, such as mountain limestone, oolite, red sandstone, gravel, dunes, peat, and alluvium. "Its superficies may be computed, roughly, at 720 square miles, an area about equal to that of an average-sized English county . . . about one-third of this area lies in the Watsonian vice-county of West Gloucester, the remainder in that of North Somerset." The additions and corrections to Murray's excellent but rather concise *Flora of Somerset* are numerous and very important. Practically, this new work may rank as equivalent to our county floras; and we consider it, upon the whole, to be a decided advance on any of them, both as regards *minutiæ* and, more particularly, in its proofs of intimate personal knowledge and research. Very wisely no attempt at subdivision is made; this must, as the writer himself says, have been largely artificial, and the county boundaries are sufficient. There is a good, clear map, on a scale of four miles to the inch. The plates of *Prunella laciniata* and *Stachys alpina* are reproduced from this Journal—the acknowledgement in one case is accidentally omitted—but that which illustrates *Ophrys apifera* var. *Trollii* and *Kœleria vallesiana* appears to be new.

Among the more famous plant-stations are the St. Vincent's Rocks, and the Leigh Woods which face them; Cheddar Gorge (remarkable for the occurrence of several northern species); and the Glastonbury peat-moors, which, however, are partly outside the district. Various introductory matters occupy 109 pages; the larger half being devoted to a history of Bristol botany, as to which the editor of the Journal adds a postscript. The list of books and herbaria consulted is exhaustive; and it is most satisfactory to learn that various old records by T. B. Flower, O. St. Brody, J. C. Collins, and others, which had been doubted, are now to a large extent confirmed.

The nomenclature is that of Babington's *Manual*, ed. ix.; and the plants dealt with (including varieties) amount to 1692, of which 1178 species are treated as permanent constituents of the local flora, 981 being regarded as native. Perhaps too many aliens have been thought worthy of a number; still the outskirts of a great town, with its neighbouring docks, favour the recurrence of such intruders, so that this somewhat liberal estimate can be defended under the circumstances.

It may be advisable to comment in some detail on selected cases; partly in order to illustrate the author's own point of view, as compared with that of some other British writers. It should be borne in mind that he has had exceptional opportunities for forming a correct opinion on difficult questions of status. Roughly speaking, his estimate of species-values is rather conservative; thus *Polygala oxyptera* Reichb., which seems to us very distinct, is here ranked as a variety of *P. vulgaris*. The brackets showing that its describer assigned specific rank to a given plant have sometimes been omitted. *Aconitum Napellus* is classed as indigenous; this we fully believe to be its true rank in such western counties as Somerset, Monmouth, Glamorgan, and Hereford. *Pæonia corallina*, on the other hand, is allotted a lower rank than many of the annual aliens; being enclosed in square brackets, apparently because its station lies outside the map. It is at least persistent, and may be an outlier, like several other rarities which occur on the carboniferous limestone on either side of the Bristol Channel. The author seems to have been misled, as regards *Cochlearia anglica*, by the figure in *English Botany*, which represents var. *Hortii* Syme; from the description the British form must be the Linnean type, Hort's 'var. *didyma*.' *Hutchinsia petræa* is quite likely to grow somewhere on Cheddar cliffs, as was alleged by Collins; and Hudson's Uphill station has probably been destroyed by quarrying. The seeds of *Stellaria neglecta* var. *decipiens* have short, blunt tubercles, even when mature; it may be absent from the district, as this character is quite constant. It would be interesting to know whether *Cerastium triviale* var. *holosteoides* of the Mendips is exactly the plant of Fries, usually found much further north. There is a good note on *Hypericum calycinum* (classed as an alien):—"This species is not believed to ripen seed anywhere in this country, but to spread and maintain itself by root-extension only. It travels far and rapidly in a favourable position." The local name Woadwaxen for *Genista tinctoria* is an instance of Mr. White's care in collecting genuine plant-words. In connection with the suggested hybrid origin of *Medicago sylvestris* it may be noticed that *M. media* Pers. (probably *M. falcata* × *sativa*) "does not appear to produce any good pods" at Burnham, where it grows with the established parents. A good case is made out for *Prunus domestica* as a likely native on cliffs near Portishead and at one or two other spots; but the absence of *P. Cerasus* from the whole area is surprising, though it thins out westwards. The remark about *Daucus gummifer*, which looks very distinct on our southern coasts (Isle of Wight, &c.), and kept its main characters in cultivation at Bournemouth (E. F. Linton), raises a doubt whether the Brean Down form was rightly identified. There is a first-rate description of the obvious differences between living *Valeriana officinalis* (*Mikanii* Syme) and *V. sambucifolia*. *Valerianella carinata*, though reckoned a colonist, grows on rocks in North Somerset, and may be as truly native there as we believe it to be near Chepstow. *Inula Helenium*, on the contrary, is regarded as certainly wild in some of its stations, and this view is favoured by its European distribution. The Somerset form of *Senecio sarracenicus*—which, though here placed as an alien or denizen, looks indigenous by stream-sides about Cole and Bruton, further to the south-east of the county—"would be more correctly classed as *S. fluviatilis* Wallr. = *S. salicetorum*, Godr. *Fl. France*; Linneus' *S. saracenicus* = *S. Fuchsii* Gmelin, is another plant with a different mode of growth, and quite other habitats, frequenting moist places in woods and wood-borders in alpine districts up to the limit of trees, say 5–6000 feet." It is by no means true that *Arbutus* at Killarney "never exceeds the height of 8–10 feet"; 20–25 feet would be nearer the mark! *Gentiana campestris* is rightly excluded; in the southern chalk districts it has been confused with *G. lingulata* var. *præcox*, and Briggs's Plymouth plant was probably *G. baltica*. *Rumex acutus* has a specific number, although it is "said to be the hybrid *R. obtusifolius* × *crispus*"; as, indeed, most people agree in thinking.

Mr. White writes of *Castanea sativa* as "a doubtful native, no doubt usually planted; but we see it flourishing in our aboriginal woods, where it may have existed from time immemorial . . . there are certainly woods in the neighbourhood of Bristol where seedling chestnuts, sprung from chance-sown seeds, can readily be found." *Carpinus Betulus* he thinks certainly native in Leigh Woods, and apparently so in some other places; this may well be right, although south-east England is its British headquarters. *Pinus sylvestris*, being decidedly calcifuge, at least in Scotland, was most probably planted on the oolite hill-tops near Bath; but the peat of Walton Moor, near Clevedon, may be a natural habitat. Mr. White consistently says of *Lilium Martagon*:—"I am inclined to accept the high probability of this fine species being indigenous in some at least of its localities. It is well known in other parts of the two counties—Tidenham Chase, the Forest of Dean, &c.—and is likely to be even more frequent than at present appears; for it grows usually in old woods amongst a thick undergrowth which might easily conceal it, even when in flower, from the casual passer-by."

With regard to *Allium Ampeloprasum*, the author suggests that "it does not appear to differ specifically from *A. Porrum*," but this is quite contrary to the reviewer's experience; the first-named is a much taller plant, often five feet high in unmanured garden soil, and very different from the cultivated Leek, both in foliage and floral characters. It has been stated, we believe, that Newton observed it on the Flat Holm (not Steep Holm—it still flourishes on both islets); and no evidence of its having been grown for food is adduced. Mr. White, however, it is only fair to add, allows that "together with Peony, this has been assumed, perhaps too rashly, to be an 'introduction.'" An extract here given from an old manorial account book seems to prove its presence on Steep Holm quite early in the seventeenth century; and Professor Trow, in the *Flora of Glamorgan*, p. 153, says:—"Storrie's experiments prove that the wild plant differs much in flavour from the types cultivated in gardens." *Lemna polyrrhiza* was seen *in flower* near Wedmore (in 1906) by Mrs. Gregory and

Miss Peck, apparently the first notice in this country. *Cyperus longus* is now lost to Somerset; but there may still be hope of its discovery in some new station, as has actually been the case with *Scirpus Holoschœnus*. An example of Mr. White's accurate observation is furnished by the case of *Carex axillaris* (though others must have seen the same thing, it does not appear to have been recorded):—"A curious feature of this hybrid deserves attention. While both *vulpina* and *remota* are stiff enough to stand erect until they wither, the much longer stems of *axillaris* are too weak to sustain their heads, and so bend over to the ground until the panicles rest upon and are hidden among the adjacent herbage." *C. depauperata*, not observed at Axbridge for about half a century, and believed to be lost, was refound by Mr. Pugsley last year. There is a lucid note on the status, habitat, and characters of *Serrafalcus* (*Bromus*) *racemosus*, which fully confirms our own experience.

Such examples could be multiplied, if space permitted; but enough has been said to shew that this work reaches a very high standard. Mr. White deserves the hearty thanks of his botanical colleagues, and the *Bristol Flora* should have a large sale. It is free from display and all suspicion of "fine writing," and illustrates the saying that "le style, c'est l'homme."

Edward S. Marshall.

The "History of Bristol Botany," which occupies pp. 44–100 of Mr. White's *Flora*, is so admirable an example of how such things should be done that I have asked Mr. Marshall to allow me to add a few words calling special attention to it. Mr. White modestly says that "it may be considered that parts of this are irrelevant and beside the mark," but to my mind the most striking merit of his treatment is its entire relevance to the botany of the district. The older authors have been carefully examined from this point of view, and although botanists will not think the by no means "dull tale" of the Bristol Flora is in need of relief, as Mr. White suggests, it must be admitted that he has made his biographies interesting even to the general reader—the sketch of Banks (pp. 67–71) and that of T. B. Flower (pp. 88–91) are excellent examples. Of the more recent Bristol botanists, whose history, curiously enough, is often more obscure than that of the earlier, I find information which will be valuable for the new edition of the *Biographical Index of British Botanists*.

I note that Mr. White still attributes the transcript of Lightfoot's Journal preserved in the Department of Botany to Solander; a belief of so long standing is not easily set aside, but a reference to this Journal for 1911 (p. 92) will show that this must be assigned to Sigismund Bacstrom, an employé of Banks. The note on p. 696 which modifies the statement (p. 67) as to Arthur Broughton's collections is likely to be overlooked, and indeed as it stands is hardly accurrate. Broughton's Jamaica collections have been lent to the Department of Botany for consultation for Messrs. Fawcett & Rendle's flora of that island, and will probably form the subject of a separate communication to these pages; for the present it is enough to say that the specimens are of Broughton's collecting, but the drawings, which are striking and interesting rather than "exquisite," are by John Lindsay, many being signed by him. Mr. White refers to "an anonymous volume of brief descriptions of British plants" published by Broughton; the description seems to apply to *Enchiridion Botanicum* (1782) but the title-page is inscribed "edidit Arthurus Broughton, M.D."—possibly "edidit" has been considered an equivalent of "edited"?

The "MS. Flora of Somerset" by Sole mentioned (p. 72) as having been in the possession of T. B. Flower is, I think, more correctly called "Flora Bathonica": Thomas Clark, in the reference given by Mr. White, speaks of it only as a "MS. flora," and there is, so far as I know, no evidence that Sole had sufficient knowledge of the whole county to enable him to produce a flora of it. Our mention of the work as "Flora Bathonica" in the *Biographical Index*—which does not appear in the list of "books consulted" by Mr. White—was, if I am not mistaken, derived from Flower himself; it is regrettable that it should have been lost, as Mr. White's reference to it leads me to suppose.

James Britten.

Boden und Klima auf kleinstem Raum. Versuch einer exakten Behandlung des Standorts auf dem Wellenkalk. Von Dr. Gregor Kraus, Professor der Botanik. Mit einer Karte, 7 Tafeln und 5 Abbildungen im Text. Gustav Fischer, Jena, 1911. 8 Marken.

Prof. Kraus has previously published excellent researches on the question of calcifugous and calcicolous plants, and in the present volume of one hundred and eighty-four pages he adds considerably to our knowledge of this interesting and disputed problem. There is here a minimum of general and evasive discussion of such academic problems as to whether the physical or the chemical factors of the soil are the more important, and a maximum of exact and experimental data. In the first part ("Das Karbonat des Wellenkalkbodens"), results of a great many soil analyses are given of stations of chalk-loving and other plants, and in the second ("Bodenphysikalisches und Klimatisches"), these are compared with accompanying physical data.

In the opinion of the reviewer the vexed question of the influence of lime on plants will only be finally settled by the application of Dr. Blackman's theory of limiting factors. The habitat of a plant is a complex of factors. In the case of a chalk-plant or lime-plant, the amount of calcium carbonate in the soil is only one of these factors; and experiments are required for the purpose of showing how the other factors are affected by variation of the lime-content. It is not merely the calcium carbonate which affects the plants. The Oxlip (*Primula elatior* Jacquin) in the woods of Cambridgeshire occurs only where the lime-content and the water-content are suitable. If either of these factors varies outside an ascertainable range, the Oxlip no longer occurs. It is probably true with regard to all the so-called chalk-plants that factors other than calcium carbonate must be taken into account and correlated with the lime-content. The most serious defect in Prof. Kraus's otherwise excellent memoir is that there is no general summary of conclusions, and no index.

C. E. M.

BOOKNOTES, NEWS, &c.

At the meeting of the Linnean Society on June 6th, 1912, Miss May Rathbone showed a portion of an unusually thick stem of *Hedera Helix*, stating that this specimen was taken from a plant of ivy growing on a tree in Cheshire. The stem, which was somewhat triangular, measured 18⅛ in. in circumference and 5½ in. in diameter at its widest part. The phlœm, which was very well marked, measured about ⅜ in. in its thickest part. The rings in the wood were not very distinct but about forty-six could be counted. The wood was very heavy. The specimen, which was 18¼ in. long, weighed 14 lb., and the specific gravity was 0·91, but, as it was weighed without removing the bark, this is only an approximation. Dr. Marie Stopes exhibited a plant of *Cardamine pratensis*, showing bulbils in abundance from the blade of the leaf as well as the axil of the flowers. Dr. Stapf remarked on the interest of the exhibit, and hoped by cultivation to find out more of the causes of this phenomenon. The phenomenon however is of very common occurrence, and may be observed in damp places where the plant occurs. It was the subject of more than one paper by the late John Price, of Chester, and has been discussed by other observers.

The *Report of the Botanical Exchange Club for* 1911 (Parker, Oxford, price 2*s.* 6*d.*) by the Secretary, Mr. G. C. Druce, resembles its predecessors under his editorship in its useful as well as in its less useful features. Among the valuable matter we may mention the notes on *Viola*; on the Ben Bulben *Polygala*, on which a note appears on p. 229 and for which Mr. Druce, having already coined one name, now substitutes another; on *Sagina*; and on the Steep Holme *Plantago* which Mr. Williams considered to be *P. Serraria*, but which Miss Cardew and Mr. E. G. Baker place as a variety—*Sabrinæ*—of *P. Coronopus*. Among the less useful features are such notes as those on the supposed *Nymphæa candida*, which has already been withdrawn from our flora by its discoverer (see p. 207)—not, however, in time to prevent its receiving at Mr. Druce's hands two new and useless synonyms: the unfortunate obsession for the creation of new names is as usual in evidence throughout the Report. Less useful still is the swelling of our lists—or at any rate of Mr. Druce's *List*, for we trust they will find place in no other—by aliens from Himalaya, Greece, North America, Russia, Hungary, Pyrenees, California, South America, South Africa, West Australia and other places: these include such common garden plants as *Aubrietia deltoidea* from a "roadside wall," such annuals as *Nemophila insignis*, and such garden trees as the Quince: in one case "only a single specimen" was seen, but this gave Mr. Druce the opportunity of renaming it. Whatever may be said as to the desirability of recording such introductions, it seems ridiculous to speak of them as "new to Britain" (p. 25); on pp. 21–22 we read of five *Compositæ*—from West Australia, South America, and South Africa, as "for the first time recorded as British, through the persevering industry of Miss Hayward," who seems to have found inexhaustible rubbish-heaps near Galashiels. We note that Mr. Druce refers incidentally (p. 44) to "the general accuracy of the lists supplied to Mr. H. C. Watson by Mr. J. F. Robinson." Mr. Dallman's deliberate ignoring of these lists (see Journ. Bot. 1907, 138) is more than justified by the information supplied, from personal knowledge, in this Journal for 1904, p. 300; and we are entirely at a loss to conjecture on what ground Mr. Druce has constituted himself the champion of a writer so hopelessly and, we fear, so mighty consciously inaccurate.

David Fry, who ranked among the abler West of England botanists, died last January in his native city of Bristol at the age of seventy-eight. The youngest member of a distinguished family identified with Bristol's progress for many generations, he shared the exceptional mental and physical vigour of his race. His elder surviving brothers are Joseph Storrs Fry, head of the great cocoa firm and a munificent philanthropist; Sir Edward Fry; and the Right Hon. Lewis Fry, P.C., late M.P. for Bristol North. Their father's residence was in Great George Street, on the slope of Brandon Hill; and here, with the rare plants of that peculiar locality almost at their door, two at least of the boys seem to have imbibed the love of natural history study that developed in later life. David was engaged in commerce until middle age, and did not show a keen interest in botany until he retired from business. Then, in a surprisingly short time, he acquired a good knowledge of the British flora, directing his attention mainly to our more difficult genera. His patience, careful observation, and acute analytical perception, enabled him to master the Epilobia, Rubi, Salices, and Carices of the district, and gave him a place of honour among his botanical associates. He never seemed desirous of publishing results of his observation; but was content, in general, to join his friends C. Bucknall and J. W. White in the collective notes on local plants that appeared in this Journal at intervals during the past twenty years. A strong liking for field-work and gardening led to successive country residences at Clevedon, Stanton Drew, Keynsham, Corston, and Saltford, all in North Somerset. At these homes many interesting species were cultivated, and the surrounding country thoroughly explored for plants. Mr. Fry's contributions to the *Flora of Bristol*, recently published, were correspondingly extensive, and his interest in the preparation of the work never flagged. That his cooperation was fully appreciated may be learnt from the tribute paid by the author in his preface:—"That which should have been a pleasant duty—the acknowledgment of assistance rendered by other botanists—has been lamentably saddened by the decease, whilst these pages were passing through the press, of an esteemed and honoured friend, David Fry. Almost every page of this book testifies to the invaluable help he afforded during the whole course of its preparation. Such satisfaction as I might have felt on completion of the work is in great part nullified by my inability to place it in his hands." He was buried in the Friends' cemetery at Lawrence Weston, a neighbouring hamlet that looks out on the Severn Sea. His collection has been given to the University of Bristol.—J. W. W.

The List of Little-known Botanists concerning whom further information is required (for inclusion in the forthcoming new edition of the *Biographical Index of British Botanists*) has been reprinted. Copies may be obtained from Mr. G. S. Boulger, 11 Onslow Road, Richmond, Surrey, or from the Editor of this Journal, and will gladly be sent to those who may be able to supply information. The response made during the progress of the publication of the list in this Journal has been very slight, and it is hoped that further information will be forthcoming concerning some, at least, of the names included.

Iowa Discomycetes, by Fred. J. Seaver (Bull. State Univ. Iowa, vi. n. 2, 1911, pp. 41–163, 41 plates), supplements and completes the preliminary paper on the Discomycetes of Eastern Iowa already published by the author. It does not claim to be a monograph of the Discomycetes but, as far as possible, a complete descriptive record of these fungi in Iowa State. Keys are given of the families, genera, and species, and careful diagnoses with interesting notes as to habitat, &c. Nearly all the plants of this group are saprophyte, and they are very widely distributed. It is instructive to note that of the fifty-six genera recorded only one—*Holwaya*—is exclusively North American; all the others are to be found in both hemispheres. A full bibliography is given, but no index.—A. L. S.

The most recent instalment (Vol. vi. part 3) of Mr. J. M. Wood's useful *Natal Plants* contains the description with two plates of a new genus of *Scitamineæ*—*Siphonochilus* Wood & Franks—established on *Kæmpferia natalensis* Schlecht. & Schum. who suggested the name. *Chrysophyllum viridifolium* is a new species established by the same authors on a plant found by Miss Franks near Durban. The part contains several interesting *Asclepiadaceæ*; the figures (by Miss Franks) show an advance on those in the earlier portion of the work.

Mr. Spencer Moore's address is now 85 King's Court Road, Streatham, S.W.

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JAMES BRITTEN, K.S.G., F.L.S.

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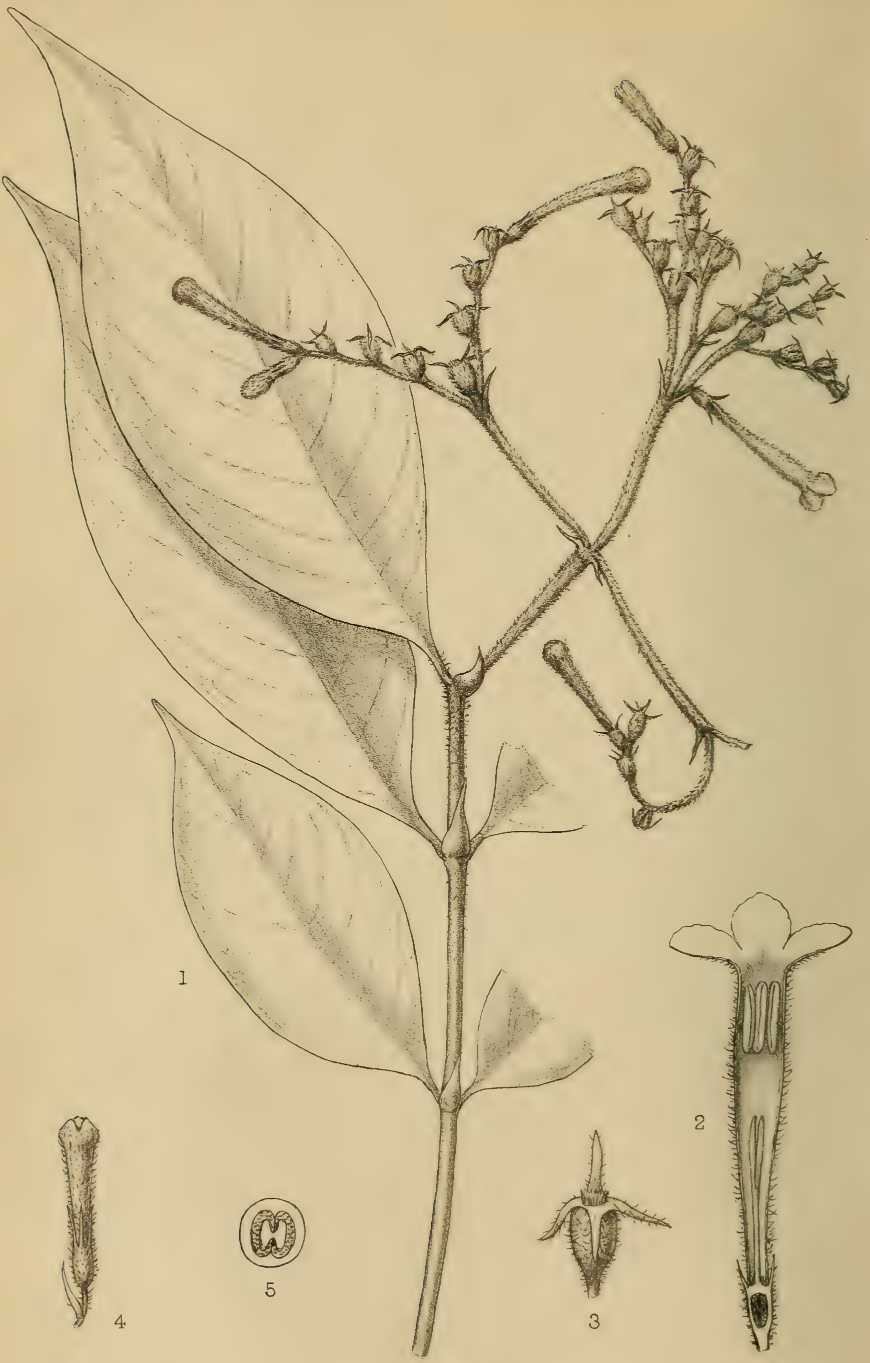

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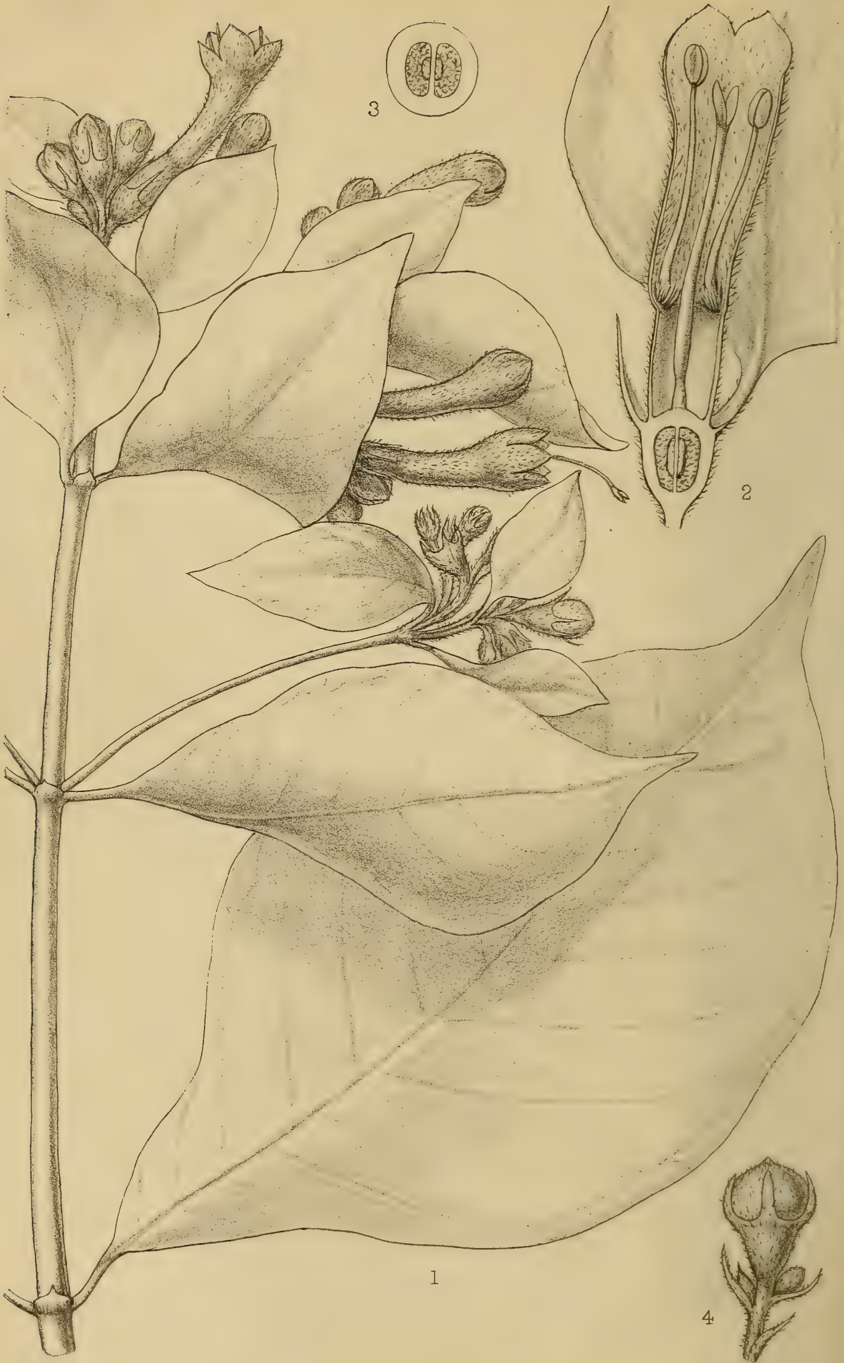
Pseudohamelia hirsuta *Wernham.*



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Carmenocania porphyrantha *Wernham.*

NEW RUBIACEÆ FROM TROPICAL AMERICA.—I.

By H. F. Wernham, B.Sc.

(Plates 520, 521.)

In the course of examining specimens of Rubiaceæ collected in various parts of Tropical America, and preserved in the National Herbarium, I have discovered the following forms which have not hitherto been described.

Carmenocania,
Rubiacearum e tribu Mussændearum genus novum.

Calycis tubus obconicus; limbi lobi 5 elongati, uno sæpe in laminam amplam foliaceam petiolatam producto. *Corolla* tubo elongato plerumque incurvo sericeo fauce villosa, infra staminum insertionem intus glaberrima, lobis parum elongatis suberectis reduplicatim valvatis. *Stamina* 5, infra corollæ medium in annulo incrassato villoso inserta filamentis longis; antheræ dorso affixæ, inclusæ, breviter ovatæ, basi lobatæ. *Discus* annularis nec valde tumidus. *Ovarium* 2-loculare; stylus filiformis stigmate 2-lobato; *ovula* in loculis perplurima, placentis carnosis septo adnatis multiseriatim inserta. *Fructus* . . . Frutices vel arbores, foliis oppositis, stipulis interpetiolaribus. Flores majusculi in cymas corymbosas terminalibus dispositi.

The exact affinities of this genus must await the discovery of the fruit. The flowers bear a superficial resemblance to those of *Isertia* and also to those of *Mussænda*, but they are readily distinguished from the former by the elongated calyx-lobes and bilocular ovary, and from both by the bent corolla-tube, the insertion of the stamens, and the shape of the anthers. On the whole, the new genus would appear to find a place in *Mussændeæ*.

Carmenocania porphyrantha, sp. unicum. Verisimiliter arbor ramulis junioribus complanatis pubescentibus demum glabratis; *foliis* plerumque obovatis basin versus leniter acuminatis cuneatis apice breviter acuminatis, breviter petiolatis, supra nitentibus utrinque minutissime papillosis nisi infra in venis sparsissime pilosis glabris, venis atque reticulo infra clarissimis; *stipulis* brevissimis, latis, apiculatis, primo densiuscule strigosis; *floribus* velutinis in corymbis multifloris plerumque sessilibus, *calycis* lobis setaceo-linearibus, segmento foliaceo dum adsit late ovato brevissime acuminato utrinque præcipue in venis minute pubescente, petiolo subunguiforme densiter appresse tomentoso, *corollæ* fusco-violaceæ extus densissime sericeo-pubescentis tubo latiusculo tubuloso insuper vix ampliato lobis ovatis brevibus obtusis suberectis, stylo nisi insuper eodem cum stigmate pubescente glabro.

Colombia: Carmen, prov. Ocaña; flowering in August, *Schlim*, 755.

Leaves 12–15 cm. long, 7–8 cm. broad; petiole up to about 6 mm. long; secondary nerves 12–14 pairs; stipules 2 mm. long.

Ovary and calyx-tube 4·5 mm. long, calyx-lobes 7–8 mm. long or expanded into a lamina over 5 cm. long and 4 cm. wide with a stalk 7–8 mm. long. The corolla-tube may attain a length of 2·5 cm., the lobes 6–7 mm. long, 4 mm. wide, glabrous within for nearly 1 cm. above the base, then densely villous in a ring where the filaments are inserted, the throat above being less densely villous, the indumentum increasing towards the mouth of the corolla. The hairy covering of the corolla consists chiefly of scaly, twisted, translucent hairs. Filaments 13 mm. or more long, anthers 2·5 mm. long. The style is of variable length; it is often exserted, sometimes very considerably.

Pseudohamelia,

Rubiacearum e tribu Hameliearum genus novum.

Calycis tubus oblongo-ovoideus; limbi lobi 4, longiusculi, patentes, persistentes. *Corolla* tubulosa insuper parum ampliata, fauce glaberrima; limbi lobi 4, ovati, rotundati, imbricati. *Stamina* 4, fauci corollæ inserta, filamentis obsoletis; antheræ dorsifixæ, inclusæ, lineari-oblongæ. *Discus* parvus densissime hirsutus. *Ovarium* biloculare; stylus brevis, validus, stigmate in duobus brachiis validis obtusis diviso; ovula in loculis perplurima, placentis septo affixis inserta. *Bacca* parva, ovoidea, disci pilis coronata, bilocularis, polysperma. Frutices v. arbores, ramulis teretibus. *Folia* opposita, breviter petiolata, membranacea. *Stipulæ* interpetiolares, nec mox deciduæ. *Flores* in cymas terminales di- trichotome ramosas subscorpioideas dispositi, secundi, mediocres, plerumque sessiles; bracteæ parvi.

The characters of the corolla, pistil, and fruit justify the inclusion of this genus in *Hameliеæ*, and it bears a remarkable superficial resemblance to *Hamelia*; but it is quite distinct in the andrœcium, the disc, the bilocular ovary, and the style and stigma, as well as in the tetramery of the flowers.

Pseudohamelia hirsuta, sp. unicum. Verisimiliter frutex, ramulis dense pubescenti-hirsutis; *foliis* ovalibus utrinque angustatis, apice acuto, utrinque ferrugineo-pilosis, venis infra conspicuis, secondariis approximatis, brevissime petiolatis; *stipulis* ovatis caudato-acuminatis, glabratis; *cymulis* dichotomis 6–11-floris, inflorescentiis omnino densiter hirsutis, *bracteis* longiusculis setaceis vel subulatis; *calycis* extus densissime pilosi lobis lineari-setaceis; *corollæ* tubo gracili, elongato, rigido, extus præcipue insuper densiter piloso, lobis majusculis patentibus, *bacca* ovoidea densissime villosa, calycis lobis patentibus persistentibus coronata.

Hab. Ecuador: *Fraser*, in Hb. Mus. Brit.

The rather lengthily and gradually acuminate leaves average about 10 cm. long and nearly 4 cm. broad, with a densely hairy petiole 5 mm. long. The stipules, apart from the almost setaceous acumen, are 5 mm. long and nearly as broad; the acumen may be more than 5 mm. long. The inflorescence is a rather lax trichotomous cyme, with peduncle over 2 cm. long and divaricate lateral branches; bracts up to 7 mm. long. Calyx-tube 3 mm. long, lobes 2–3 mm. long, or over 4 mm. long in the fruit. Corolla-tube

2·3 cm. long, lobes about 4·5 mm. long and 3 mm. broad. Anthers 5 mm. long.

Malanea roraimensis, sp. nov. Verisimiliter frutex scandens, ramulis novellis strigoso-pubescentibus demum glabrescentis asperis; *foliis* oblanceolatis brevissime vel vix acuminatis obtusiusculis basi leniter angustatis utrinque in venis ipsis glaberrimis, petiolo tamen nonnunquam obscure puberulo breviusculo; *stipulis* deciduis ovatis ad lanceolatis glabris; *inflorescentiis* subspicatis interruptis rachide tenui ut pedunculus longiusculus dense strigoso-ferrugineo-pubescente bracteis parvis breviter lanceolatis; floribus minimis 4-meris, *bracteolis* minutiusculis late ovatis intus glaberrimis extus strigosis; *calycis* dentibus brevissimis latissimis valde obtusis nisi pilis perpaucis apicem versus ut tubus glaberrimis; *corollæ* lobis oblongis obtusis extus sparsissime intus densiuscule barbatis quam tubus extus sub glabrato dimidio longioribus; *antheris* lanceolatis obtusis 3–3½-plo longioribus quam latis.

Hab. Roraima, British Guiana, *Schomburgk*, 1002; 159 (299).

Leaves 8–9 cm. long, 3 cm. broad, petiole 7–10 mm. long; secondary nerves 9–11 pairs; stipules 7–10 mm. long; peduncles 3–4 cm. long; flowers about 3 mm. long.

Distinct in its oblanceolate, quite glabrous leaves.

Ixora Funckii, sp. nov. Glaberrima, *foliis* ellipticis utrinque angustatis acutissimis, nerviis secundariis parum conspicuis rectis subhorizontalibus, petiolo brevissimo vel obsoleto, *stipulis* subsetaceo-linearibus diutius persistentibus; *cymis* paucifloris laxissimis ramula brevia lateralia terminantibus bracteis parvis subulatis, floribus 4-meris longe et tenue pedicellatis bracteolis lanceolatis calycis medium excedentibus; *calycis* dentibus subulatis, *corollæ* tubo gracillimo extus glaberrimo quam lobi triplo longiore, lobis oblongis acutis, *antheris* exsertis, *stigmate* clavato stylo aliter vix exserto.

Hab. Venezuela, *Funck & Schlim*, 640.

Mature leaves 13 cm. and nearly 5 cm. broad; petioles not exceeding 3 mm. Stipules 6 mm. long. Peduncles up to about 1 cm. long; pedicels 1–2 cm. long. Ovary and calyx-tube 2·5 mm. long, teeth 1·5 mm. long. Corolla-tube 2·8 cm. long, lobes barely 1 cm. long, and 2·7 mm. broad.

Remarkable for its complete glabrousness; the nearest ally seems to be *I. bracteolaris* from Eastern Brazil, but there are several clear points of difference.

Ixora nicaraguensis, sp. nov. Verisimiliter frutex, ramis florentibus cinereo-corticatis nodosis densiuscule foliosis, nisi in inflorescentiæ terminalis ramulis obscurissime pubescentibus glabra; *foliis* parvis pergamaceis cymas vix excedentibus ellipticis utrinque angustatis acutis glaberrimis petiolo brevissimo validiusculo, venis nec multo prominentibus; *stipulis* triangularibus basi in vagina breve connata insuper recurvis acutis; *floribus* inter minores in cyma trichotoma sessile dispositis, bracteis minutiusculis; *calycis* limbo subtruncato, *corollæ* glabratæ tubo pedicellam parum excedente, lobis oblongis rotundatis tubo dimidio brevioribus.

Hab. Nicaragua: *Seemann*, 117.

Leaves about 8 cm. long, 3 cm. broad. Petioles barely 4 mm. long. Stipules 5 mm. long including sheath, 1·5 mm. long. Inflorescence 5–6 cm. long, and equally broad in the widest part. Calyx barely 2 mm. long; corolla-tube 5 mm. long. Lobes 3–4 mm. long, 1·3 mm. wide. Anthers 2·5 mm. long.

Galium Trianæ, sp. nov. Caule diffuso validiusculo nitente angulis nec uncinulatis sparsissime piloso nodis sub foliis densiuscule villosis exceptis; *foliis* plerumque deflexis, uninerviis, brevibus, oblongis ad linearibus vel subovatis, margine valde reflexo, glabris vel subglabris, in siccitate nigricantibus, supra nitentibus minute papillosis, subcoriaceis, apice acuto; *inflorescentia* paniculata multiflora, longa laxiuscula nec lata; *fructu* parvo pilis uncinulatis hispidissimo, pedicellis brevibus divaricatis.

Hab. Colombia: *Triana.*

Distinct in the short stunted-looking, shining, almost leathery, deflexed leaves, not exceeding 6 mm. and usually less than 5 mm. in length; the internodes are about eight times as long. The nearest affinity is *G. canescens*, at once distinguishable by the indumentum.

Galium larecajense, sp. nov. *Caule* subscandente, angulis sparsiuscule et minute uncinulatis, glabro; *foliis* uninerviis, nec deflexis, longitudine mediocra, lanceolatis apicem subsetaceum versus leniter acuminatis, planis nec revolutis, margine venaque media subtus nonnunquam aliter uncinulis minutis indutis, aliter glabris, membranaceis; *inflorescentia* pauciflora; *fructibus* majusculis pilis uncinulatis hispidissimis, plerumque solitariis in ramulorum brevium lateralium axillaribus, pedicellis demum rectis longiusculis.

Hab. Bolivia: prov. Larecaja, viciniis Sorata inter Munaypata et rivum Challasuyo, in dumosis. Alt. 2600–2700 m. February to April, *Mandon*, 339.

Near *G. Mandoni*, but readily distinguished by the hispid fruits.

Galium Fraserii, sp. nov. *Caule* diffuso, angulis minutissime uncinulatis, glabro; *foliis* trinerviis, 4-natim verticillatis, breviusculis, ovalibus margine plerumque revolutis hinc oblongis apparentibus, brevissime acuminatis acuto apice, subrigidis, scabris, validiusculis, glabris; *inflorescentia* 2–3-flora; *fructibus* nigricantibus, majusculis, subcarnosis, lævibus, glabris.

Hab. Ecuador; *Fraser* in Hb. Mus. Brit.

Notable for the short, rigid, scabrid, tough-looking leaves, and large black berry-like fruit. The latter is the chief point of difference from *G. Trianæ*, the nearest affinity.

EXPLANATION OF PLATES.

PLATE 520.—*Carmenocania porphyrantha.* Fig. 1. Portion of plant, natural size. Fig. 2. Flower in longitudinal section, × 2, showing one subulate calyx-lobe, and part of the foliaceous lobe. Fig. 3. Ovary in transverse section, × 2. Fig. 4. Flower-buds and bracts, × 2.

PLATE 521.—*Pseudohamelia hirsuta.* Fig. 1. Portion of plant, natural size. Fig. 2. Flower in longitudinal section, × 2. Fig. 3. Fruit, × 2. Fig. 4. Flower-bud, × 2. Fig. 5. Ovary in transverse section, × 2.

TWO LINUMS OF MILLER'S DICTIONARY ED. 8 (1768).

By James Britten, F.L.S.

Linum hispanicum Mill.

In the *Index Kewensis* "Linum hispanicum Mill. Gard. Dict. ed. viii. n. 7" is given as synonymous with *L. angustifolium* Huds., and Mr. Williams (Prod. Fl. Brit. p. 485) recognizing that, if this were so, Miller's name (being the earlier) would have to stand for the species, adopts it, placing *L. angustifolium* as a synonym. He quotes Miller's description, and adds: "Any doubt about the identity of this plant with *L. angustifolium* is set at rest by the examination of Miller's type-specimen of *L. hispanicum* in Herb. Mus. Brit., which agrees exactly with the current descriptions of *L. angustifolium* in English floras."

As Miller's specimens presented to my eye no resemblance to any of the numerous examples of *L. angustifolium* in the National Herbarium, and as Dr. Rendle concurred with me in failing to see any correspondence between them, it seemed worth while to look further into the matter, which I have done with the following results.

Planchon (in Hook. Lond. Journ. Bot. vii. 174 (1848)), who had seen the specimens—there are two—on which Mr. Williams relies, refers them without doubt to *Linum perenne* var. *anglicum*. One of them corresponds very closely with t. clxvi. fig. 2, of Miller's *Figures of Plants* "described in the *Gardeners Dictionary*" (1757); this however is cited by Linnæus (Sp. Pl. ed. 2, 397) and by Miller as representing *L. perenne* (n. 6), from which in the letterpress accompanying the plate Miller first separates the English plant usually so called; this he subsequently (Gard. Dict. n. 5) named *L. anglicum*.

The specific distinctness of the two was accepted by Schiede, who in *Linnæa* (i. 72 (1826)), after describing *L. perenne*, of which he distinguishes three forms, says: "Affine *Lino anglico* Mill., cui adjungo *L. montanum* Schl., sed differt fructibus deflexis, qui in hoc constanter erecti sunt"; and by Mr. Williams (*op. cit.* 483), who regards the *L. perenne* of English floras as distinct from "the Linnean *L. perenne* in its restricted sense." Syme (Engl. Bot. ed. 3, ii. 183), as Mr. Williams points out, had indicated the same conclusion, and a comparison of specimens tends to confirm this view. We have specimens of both *L. anglicum* and *L. perenne* from Chelsea Garden, collected in 1757 and 1761, during Miller's curatorship, one of the latter being from his herbarium. Neither specimen of *L. perenne* corresponds as closely with Miller's figure as does the one of *L. hispanicum* mentioned above. The three plants—*L. perenne*, *L. anglicum*, and *L. hispanicum*—stand respectively as nn. 5, 6, and 7 in the Dictionary, and to my mind represent *L. perenne* in its wider sense; how far they may be separable as species or forms does not now concern me, my only object being to show that *L. hispanicum* Mill. is not—*pace* Mr. Williams—identical with *L. angustifolium* Huds. It is noteworthy that Martyn, in his edition of Miller (1807), places nn. 5 and 6 together under *L. perenne* as *α decumbens* and *β erectum* respectively—the former will supersede *L. perenne α anglicum* of Planchon (1848)* if the English plant be ranked as a variety. *L. hispanicum* is unnoticed by Martyn, which seems to indicate that even then it was regarded as obscure. Willkomm and Lange (Prodr. Fl. Hisp. iii. 549) enter it doubtfully under *L. angustifolium*, probably because the name *hispanicum* indicated a Spanish plant which had to be accounted for, as there is no evidence that they consulted Miller's description: Dr. Jackson suggests that the entry in the Kew Index may have originated with this, the question-mark having been accidentally omitted.

Linum bienne Mill.

Although it is thus, I think, clear that Miller's *L. hispanicum* cannot supersede *L. angustifolium* Huds., my examination of Miller's plants has resulted in the finding of another candidate for priority whose claims cannot be disposed of—a discovery, however, in which I find I have been anticipated by Planchon (*loc. cit.* 167), who places under *L. angustifolium* Huds., "*L. bienne* Mill. Herb. in collect. Banksiana!" † Martyn (*l. c.*) throws no light on the plant, and the name stands unreduced in the *Index Kewensis*, Planchon's identification having been generally overlooked. There can be no doubt as to its accuracy, and Miller's name must stand. Miller, oddly enough, makes no reference to the plant which we have been accustomed to call *L. angustifolium* as British, either under *L. bienne* or under *L. tenuifolium*, under which we might have expected to find it; it is added by Martyn in the ninth edition. Linnæus, as Mr. Williams rightly supposes, included the plant—"very improperly," says Smith (Eng. Bot. t. 381)—under *L. tenuifolium*; he refers to it under this name in his *Flora Anglica* (1754) and was followed in this by Hudson (Fl. Angl. 116) and Withering (ed. 1, p. 191 (1776) and ed. 3, ii. 317 (1801)): in this latter reversion replacing *L. angustifolium* Huds., which the ever-accurate Stokes had introduced into ed. 2 (1787). The earliest record as British, which Mr. Williams ascribes to Gerard, should be attributed to Turner (1562) as quoted by Clarke (*First Records*, 32): "I have seene flax . . . wilde in Sommersetshire wythin a mile of Welles."

---

* Planchon quotes "*L. perenne α Anglicum* Schiede *l. c.*" (*i. e.* "in Linn. vol. i. p. 71"), but no such name appears there, and Schiede incidentally (see above) accepts *L. anglicum* as a species.

† It may be noted that in this as in the preceding case Planchon makes no reference to Miller's description in his *Gardeners Dictionary*—a work which was at that period practically ignored and whose importance in matters nomenclatorial has only been recognized comparatively recently.

The following synonymy sums up the above remarks:—

LINUM ANGLICUM Mill. Dict. n. 5 (1768); Williams, Prodr. Fl. Brit. 483 (1912).
  L. perenne L. Sp. Pl. 277 (1762), in part; L. Fl. Angl. 14 (1754) et auct. plur. Brit.
  L. hispanicum Mill. *op. cit.* n. 7 et Herb.! ex Planch. in Hook. Journ. Bot. vii. 174 (1848).
  L. perenne var. *decumbens* T. Martyn in Mill. Gard. Dict. ed. 9, n. 9 (1807).
  L. perenne var. *anglicum* Planch. *l. c.*

LINUM BIENNE Mill. Dict. n. 8 (1768) et herb.!
  L. tenuifolium L. Fl. Angl. 14 (1754), L. Amœn. Acad. 99 (1759), non L. Sp. Pl. 278 (1752); Huds. Fl. Angl. 116 (1762); With. Arr. 191 (1776).
  L. angustifolium Huds. Fl. Angl. ed. 2, 134 (1778) et auct. pl.
  L. tenuifolium var. *angustifolium* With. Arr. ed. 3, ii. 317 (1801).
  L. hispanicum Ind. Kew. ii. 92 (1894); Williams, Prodr. Fl. Brit. 485 (1912); non Mill.

CHANGE OF CLIMATE AND WOODLAND SUCCESSION.

By the Rev. E. Adrian Woodruffe-Peacock, F.L.S.

No thoughtful evolutionist will deny that our present flora must be most intimately connected with that which existed in prehistoric and historic times. Astronomically it is a simple matter to say when, by the precession of the equinoxes, the northern hemisphere would be enjoying its mildest climatic conditions. Lord Avebury says (*Prehistoric Times*, p. 381): "Up to [1248] the duration of summer was increasing; it is now, and has been for 630 years, gradually diminishing."* It would seem that the years 1080 to 1480 A.D. would be those of specially warm weather, summer and winter. Now Domesday Book, which was written in 1085–86, contains thirty-eight entries of valuable vineyards of two to six acres each in Lea valley; there was another at Ware and one in Essex. In later Norman times the Isle of Ely, surrounded by peat, was called "the Isle of Vines." Places called "vineyards"—little strips of market garden—can be pointed out to-day. It would seem that the planting of vines became "quite the thing" in the reign of Stephen, about 1140. The Church, following her custom of hospitality, responded nobly. Prior John, of Spalding, Lincolnshire, planted vineyards, in witness whereof there is a Vine Street in that market-town to-day. The Abbot of Peterborough also planted; and Denary Abbey, Bury St. Edmunds, and the Priory at Dunstable, all had vineyards. Most of the barons of that period soon possessed vineyards. The hills of Godalming, in Surrey, and the Hampshire Downs, were once covered with vines. Kent had vineyards, too, for the hop had not yet reached this country to be a competitor for favour. The valley of the Severn at Gloucester, according to William of Malmesbury (1100 to 1150 ?), was the chief vine-producing district in England, there being more vines and better grapes grown in that county than in any other part of England.*

This evidence for a distinct change of climate for the worse of late years is not an isolated case. Sir Joseph Banks, writing about five dug-out boats of oak found in Lincolnshire just before 1816, says: "All these canoes are remarkable for the free grain of the oak timber, so that millwrights and carpenters who examined it declared that in their opinion it was of foreign growth, and the produce of a warmer country."† Practically, the wood of all species in the later middle period peats has this same open texture, while that of the post-glacial and older middle period peat-beds is close-grained and that of the very latest peats is closer grained, approximating to the wood of to-day. There seems to be a perfectly demonstrable transition from the woods of semi-arctic conditions to trees grown in a climate much milder than ours, with warmer winters and longer summers. The whole subject wants systematically enquiring into, wherever peat-wood is discovered, if its exact horizon can be ascertained.

Peat has been forming in Lincolnshire, with large gaps no doubt, from the retiring of the chalky boulder clay ice-sheet to the present day. This has taken place under slightly varying conditions of geological elevation and depression and a more regular and distinct change of climate. For our purpose the geological evidence may be disregarded, as it is too trifling to affect the climate. The whole county being more or less formed of limestone, the peats generally are of the *Hypnum* in contradistinction to the *Sphagnum* moss type, *i. e.*, they were formed in limestone rather than in neutral or acid waters. This is, however, only their general character; there is no iron rule. At Scotton Common to-day *Eriophorum vaginatum*, an acid peat species, is found not far from *Helleborine longifolia*, a lime-water peat species. These beds overlie one another in section on the common. In one place I found *Hypnum* beds with *Betula tomentosa*, overlaid by a *Sphagnum* bog with a clearly defined *Eriophorum vaginatum* bed between. In another spot, I have been told, this order is reversed; but of this I have no personal proof.

It soon becomes clear to anyone studying our peats that three periods can be detected in them:—(3) An Historical, (2) a Middle, and (1) a Subarctic Period. These may be classed roughly in Lincolnshire as follows, by their tree flora:—

The Historical Period is that of *Ulmus montana*, *Fraxinus*, and *Ilex*. Looking from the present backwards, of fairly close to open-grained woods.

The Middle Period at its latter end is one of open-grained woods; then close-grained. It gives us all the rest of our forest trees, and the whole list of fen-plants associated with limy peat-waters.

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* William of Malmesbury's *Historica Novellæ*; Mr. G. Abbey, *Journal of Horticulture*, 1899.

† *Journal of Science and Arts*, vol. i. p. 244 (1816).

For the Subarctic Period *Quercus pedunculata*, the Bog-birch, and Scotch Fir, all close-grained, are the characteristic species. For the very lowest level of the fenland all that can be said is that *Betula nana* is on record without details as to its occurrence.

This, however, only in the roughest way indicates the nature of our peat records. For instance, there has been no definite Peat Period, though the Middle Period might be so called, from the richness of its species and the greater depth of its varied accumulations. No doubt one time had conditions which produced greater growth than another, but never regularly or for any great length of time without considerable breaks. As many as five "unconformities" or periods of change, marked by renewed forest growth, can be found in one bed of peat only from eight to twelve feet thick. A time conducive to peat growth at one spot would be quite balanced during a less active period by the circumstances of another place being better adapted for rapid accumulation. The whole evidence goes to prove that, from semi-arctic times to the present day, peat has been forming in one place or another. It is impossible to indicate all the recognized facts in a paper. I can only outline the more important ones.

The old trees of the *Middle Period* seem to have followed in some such order as this:—

1. *Pinus sylvestris*
2. *Betula tomentosa*
3. *Quercus pedunculata*
4. *Alnus rotundifolia*
5. *Taxus baccata*
6. *Acer campestre*
7. *Corylus Avellana*
8. *Fagus sylvatica*

Historic Period.

9. *Fraxinus excelsior*
10. *Ilex Aquifolium*
11. *Ulmus montana*

Present Period.

12. *Ulmus campestris*
13. *Acer Pseudoplatanus*

This order may vary very greatly at any given spot, for geological and other reasons. The peat-beds were always formed in low-lying swamps, often apparently by the blocking up of watercourses through wooded ground after a hurricane. Later on, when by changes of drainage the beds dried, or in other cases grew up to the woodland stage level, their tree flora always came from the surrounding higher lands. Now some species can grow freely on peat, others cannot.

The oak, Scotch pine, bog birch (*B. tomentosa*), and yew, do well on it. Alder does badly, and only where there is no lime-water, which is rare with us in Lincolnshire, so this tree, even to-day, is rare. The ash and beech grow only where there is a great excess of lime-water, and then only close by the peat, not on it.

To go into this matter a little more fully, the following seems to be the law:—The pedunculate oak may be found under peat with any and every surrounding geological combination of rocks without exception; the pine with sands and gravels near at hand; yew especially in the neighbourhood of limy gravels carrying oak, not far from beech-woods, which acted as the covering species, as at Cadney. Bog birch comes before and follows after all the species, especially near damp sands. Alder is only rarely recorded, where alluvial valleys, with water fairly free from lime, have been engulfed. Maple is associated with limy clays and gravels, the nut with limy clays and estuarine alluviums; beech with limestone escarpments, limy gravels, marls, or low-level clays rich in limewash from escarpments above; holly with limy gravels on clays; ash with limy clays; and wych elm only along with it.

This is as much as saying that the conditions found from the earliest peat records to the latest are such as might be expected from the known requirements and geological distribution of species to-day. While this may generally be allowed to be true, the statement must be carefully qualified. In particular cases it is far from the fact, unless a great change of climate is allowed for. The past history of two trees will illustrate what I imply perfectly clearly. Let us take *Pinus* and *Fagus*.

Three men of fairly wide experience have given special study to the Scotch pine in Lincolnshire, and have come to identical conclusions about it. The late Mr. Spencer, of Market Rasen, a wood-buyer by profession, of the widest experience, told me in 1896 that he had tried to gather the traditions, as far as he could, of the one hundred and fifty years before his own data. He believed that pinesques—or *Pinus* wood—had *always* flourished round Market Rasen. They were self-seeding on the sands of Holton, Linwood, and the whole Warren district, unaided by man. My friend Mr. F. A. Lees was resident in Market Rasen during 1877–79, and after carefully studying the matter, came to the same conclusion. His argument he told me was this. Pinesques require moist but rapidly draining sands, such as are found in the Rasen district. These sand-dunes, at all depths, contained pine-cones and traces of woods that had flourished freely at former dates. The latest of these Eolian sands must be about contemporary with the first enclosures designed to stop their drift. These enclosures were contemporary with the first planted woods in Lincolnshire, which were wind-breaks after 1780. I myself came back to work in this county again in 1891, aiming at more exact floral analyses than had been made before. I soon discovered that the ground flora of the existing pinesques has the facies of old woodlands, not of new ones, *i. e.*, a distinct character of their own. They are the same in species so far as climate will allow, and, more important still, are of practically of one in frequency with the allowed areal pinesques of Scotland. In Lincolnshire *Pyrola minor* may safely be taken as the best index species; wherever it is found growing in the county to-day pine-woods can be proved formerly to have been present or still exist. Place-name philology does not help us with the past history of the pine, as it does with that of the oak, beech, ash, alder, and other species in Lincolnshire. Pinesques were all over on fitting soils at one time, as can be proved from the Early Middle Period and late Subarctic Peat records; but before the Historic Period the pine seems to have been confined by a warmer climate to a few isolated spots on moist but freely draining sands in cool, low-lying localities. The most important fact about the pine is that which Sir Joseph Banks first pointed out, though he gave a wrong explanation for it—I mean that the grain of the wood varies with the heat of the climate in which it has been grown, from close to open texture, and then closer again in a few places where the species still flourishes.

As regards the beech we are not in exactly the same position. There are, as might be expected, few peat records existing, and these indicate a much wider extension eastwards of fagesques than do the present woods of England. There are also the remains of what appear to be areal beech-woods, at two places wide apart in Lincolnshire—Bigby and Somerby, on the sheltered escarpment of the wolds, is one of these. The trees there are in the same position in relation to the hill and valley as in the south-west of England. The name "Bigby" is most helpful, too. "It is a comparatively modern corruption of 'Beykeby,' in which it is easy to recognise the old Norse *beyki*, beech-wood."* This tree still forms the conspicuous feature in the villages named, as no doubt it did in the period 800 to 1000 A.D., though in the last twenty years the beech-tree canker has carried off many of the finest specimens.

The other spot is Summer Castle, Fillingham, on the Lincolnshire limestone with ninety-five per cent. of calcium carbonate. From this place, "in an old beech wood, which is native with us here, cut down, stubbed, and made into ploughed land before I was born," Mrs. B. Portman-Dalton, his granddaughter, wrote to me, that the Rev. James Dalton took and recorded *Monotropa* in 1805. It is our only record, and "a distinct beech-wood saprophyte," Mr. F. A. Lees told me, as far back as 1893, when I was busy hunting for Dalton's Lincolnshire specimen.†

These remains of former fagesques in both cases are on the right soil and locality, to judge by the south and south-western woods. We know from its name that at one spot at least its history goes back approximately to the period of steadily growing heat and length of summers. Is it safe to assume that these two traces of fagesques are representative of other vanished woods? I think so, on account of the few peat records that we possess, and for another equally important reason. There is a rare beech-wood land-shell, Rolph's *Clausilia*, which is practically confined to the south and south-west chalk beech-woods. It is found to be widely distributed in Lincolnshire on chalk and limestone. It is apparently now confined to ash-oak woods with us. There is a connection also towards the southern fagesques through Nottinghamshire and Northamptonshire, where the shell is sparingly found in similar woods. How could this rare species have become distributed so widely on our limestones without the aid of its native fagesques? The two districts named above as our only beech-woods are the only spots where *Buliminus montanus*, another distinct fagesque shell once reported for this county, is likely to occur with us. So far as I know, neither of these old beech-wood districts has been thoroughly searched for its associated shells, so it is possible that the most striking evidence may be turned up at any time.

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* Rev. G. S. Streatfeild's *Lincolnshire and the Danes*, 1884, p. 227.

† Curiously enough, the only spot where I personally have seen *Monotropa* growing is as unlike a fagesque as can well be imagined. The Rev. W. W. Mason pointed it out to me on the Lancashire coast-dunes. This sand was mixed with a large proportion of comminated sea-shells. How frequently are these sources of lime ignored, both in recording and interpreting the facts of environment!

The wide range of *Pinus* before historic times and the general indications which point to a similar history for *Fagus* just within but rather beyond these times are not isolated facts. They fit in with what we know about all the other species for which we possess peat records, as well as with the cultivation of the vine as a field crop. All the facts which have come to light point clearly one way. They demonstrate a former period of greater heat, from more prolonged sunlight and milder winters well within the Historic Period—detrimental to *Pinus*, but suitable for *Fagus*-growth. Surely the high-level forests of the Pennines, of pine, hazel, and bog-birch, point to the same conclusion? They are far above the present tree level of our existing normal temperature. I believe that all the facts that may be collected will only tend to the same conclusion, as soon as we begin to enquire; and that is not all, for the same thing is going on to-day.

There can be little doubt that in Lincolnshire the ash has taken the place of the oak and beech, as certainly as *Betula alba* and *B. pubescens* have ousted the pine in drier and moister localities, all well within the Historic Period. It is certain, too, that this process of change has not ceased with us. The yew has gone from Lincolnshire as an areal species, though it was quite common once, as in the parish of Cadney. A hundred and twenty years ago *Pinus* was confined to a few isolated spots. To-day I watch the same process in operation. The ash is being slowly supplanted by the wych elm, and even that, as well as every other species, fails in the struggle for existence in the open with the sycamore, on account of its winged and far-carrying seeds—this notwithstanding that the wych elm is better fitted for our climate in all other respects.

Anyone wishing to interpret logically and formulate clearly our existing tree formations cannot safely ignore the change of climate which has plainly taken place within historic times, without misinterpreting some of the most important facts which may be observed in our present woodland growths. It is not wise to forsake the ground of fact for surmises, even about our pine and beech woods. The case of Denmark is too explicit. The beech, now the predominant species there, was unknown in the Bronze Age, or, in other words, it reached Denmark and North Lincolnshire at about the same period. In the Lower Peat bed of that country the pine, which does not naturally grow there now, took the same place as formerly with us. It was followed in time by the oak and birch (which are now very rare though areal in Denmark) before the beech arrived there. A good rule for all students of our flora is—Deal with known facts, but be very sparing of generalizations about the surmised past history of species or formations.

NOTES ON TROPICAL AFRICAN CONVOLVULACEÆ.

By A. B. Rendle, D.Sc., F.R.S.

The following notes were made during the determination of collections recently received in the National Herbarium from various parts of tropical Africa. The chief interest lies in the plants brought by Mr. T. Kassner from the South-east Congo, the affinity of which is largely Angolan, though partly East African, corresponding with the intermediate position of the area.

Ipomœa Randii Rendle, hitherto known only from the type specimen from Buluwayo, has been supplemented by a fine specimen sent by Dr. Rand (no. 1423) from Salisbury (The Commonage). It has large handsome deep purple flowers.

I. linosepala Hall. f., hitherto known only from Angola, where it was found by Welwitsch and Gossweiler, has now been collected by Kassner (no. 2300) in the Congo area—at Tonkoosji, Katanga, near source of the Lubembe River, in forest, at 5000 ft. altitude.

Ipomœa alpina, sp. nov. *Frutex* ut apparet nana, strigosa, ramis tenuibus lignosis, superne dense foliatis. *Folia* lineari-oblonga obtusa uninervia, breviter petiolata. *Flores* in axillis foliorum superiorum solitarii, breviter pedicellati; bracteis anguste linearibus strigosis; sepalis coriaceis, ovatis, longe-acuminatis, sparse strigosis vel glabrescentibus; corolla infundibuliforme.

Hab. Mt. Senga, Congo, near Lake Tanganyika, on rocky overgrown precipices at 5000 ft.; in flower, May 29, *T. Kassner*, no. 2909.

Apparently a low-growing plant; shoots 7–8 cm. long, the stem, leaves, and bracts bearing long stiffish white hairs springing from a hardened base; stems about 1 mm. thick; leaves to 3·5 cm. long and ·5 cm. broad, petioles 2–3 mm. long. Peduncle 3–5 mm. long, pair of bracts from about the middle of the peduncle barely 1 cm. long, ·4 mm. broad. Sepals about 8 mm. long. Corolla, closed after flowering, 2·6 cm. long.

Recalls *I. linosepala* Hall. f. in habit, indumentum, and the narrow linear hairy bracts, but is distinguished by the narrower leaves and the broader-based glabrescent sepals.

I. velutipes Welw., an Angolan species (Golungo Alto), has been collected by G. L. Bates in the South Cameroons, at Bitye, near River Ja.

I. PES-TIGRIDIS L. var. STRIGOSA Hall. f., an Angolan (Huilla) form, now found by Kassner in the Congo—"Kasomena, Katanga, bushy hilly country, sparsely overgrown with trees, east of the Kundelungu Mountains, at 4200 ft.; under trees, no. 2554, in flower, March."

I. BARTERI Baker var. STENOPHYLLA Hall f., an east tropical African form now brought by Kassner from the Congo; Lubembe Valley, Katanga, swampy patches in forest country at 3500 ft., no. 2382, in flower, January.

Ipomœa Kassneri, sp. nov. *Suffrutex* parva pilosa, ramis prostratis vel decumbentibus. *Folia* lineari-oblonga vel elliptico-oblonga vel oblanceolato-oblonga, obtusa vix mucronata, basi obtusa vel rotundata, breviter petiolata. *Cymæ* 1–3-floræ, pedunculis tenuibus axillariis, bracteis foliaceis, bracteolis linearibus. *Flores* sessiles, sepalis coriaceis ovatis ad oblongo-ovatis acuminatis vel acutis, glabris, apice pilosis; corolla campanulato-infundibuliforme, (?) rosea; polline et stigmate generis. *Capsula* . . . .

Hab. Kushiba River, Katanga, Congo; on the border of the grass plain which occupies the river valley, 4500 ft. alt., in flower, Jan. 27, *T. Kassner*, n. 2410.

Shoots 2–2·5 dm. long, slender, barely reaching 2 mm. in thickness, clothed like the leaves with long spreading stiffish hairs. Leaves 3·5–5·5 cm. long, ·9–1·8 cm. broad; petiole 2–4 mm. long. Peduncle 2·5–3 cm. long; bracts 1·5–2·3 cm. long, bracteoles to 1·5 cm. long. Sepals 6–5 mm. long, the outer three slightly longer than the two inner. Corolla about 3 cm. long.

A very distinct species of the section Leiocalyx recalling *I. simplex* and *I. Welwitschii* in habit, but at once distinguished by the leafy bracts.

I. SHIRENSIS Oliver, a Nyasaland species now brought by Kassner from the Congo—"Binga, Katanga, at foot of the Kundelungu Mts., growing under trees on the steep clay sides of a deep washed-out watercourse, at 4000 ft.; no. 2625, in flower, March."

MERREMIA STELLATA Rendle, described from a specimen from Gossweiler, Angola (open woods at Kului), now brought by Kassner from the Congo—"Kantu, on a flat grassy wet plain on an old ant-heap overgrown with small bushes at 4200 ft. (no. 2374)." The Congo plant differs from the type in that the characteristic stellate hairs are almost confined to the stems and flower-stalks, the leaves being practically glabrous.

A NEW VARIETY OF *PARNASSIA PALUSTRIS*.

BY W. G. TRAVIS & J. A. WHELDON, F.L.S.

ON the coasts of Lancashire and Cheshire *Parnassia palustris* Linn. occurs in a form which differs in several respects from the inland plant. After a careful study of this littoral form we have come to the conclusion that it is worthy of varietal rank. So far as we know it has not hitherto been described.

It may be of interest at the outset to consider the distribution of *Parnassia* in the Mersey province, and to cite the local Floras in which reference is made to the littoral plant, with which we are more particularly concerned in this article.

In Lancashire *Parnassia palustris* is one of a small number of plants, the distribution of which is of special interest from the fact that they occur only in the upland and littoral districts, and are absent from the intervening ground. The nature of the habitats is thus summarized in the *Flora of West Lancashire*: "Upland swamps and rill-sides, and damp sandy places near the sea." In West Lancashire (v.-c. 60) *Parnassia palustris* is not unfrequent in suitable situations, and is recorded for seven out of the eight divisions into which that vice-county was divided for purposes of botanical investigation. In South Lancashire (v.-c. 59) the Grass of Parnassus, as a plant of the uplands, is rarer than in the sister vice-county, being at present only known as occurring in the upper drainage basin of the River Calder, where it is rather plentiful in several localities. It is, however, fairly common, and, in fact, locally abundant, in many of the wet hollows among the sand-dunes which line the coast between the estuaries of the Mersey and the Ribble. It occurs also on the Cheshire coast, but less plentifully, as the dunes there are of a dry type. It will be instructive to quote here the various comments made on the coast plant in the local Floras. Hall, in his *Flora of Liverpool*, 1839, p. 15, says:—"In damp grassy spots among the sandhills, on the shores of the Mersey. . . . I have specimens from Hoylake which are *scarcely an inch high*, the flower just appearing above the leaves, which are all radical, and specimens are *rarely met with more than six inches high*." Dickinson's *Flora of Liverpool*, 1851, p. 30, says:—"Common in bogs, and wet places amongst the sandhills on both sides of the Mersey," and he cites as localities New Brighton, Hoylake, Seaforth, Formby, Southport, &c. The *Flora of Liverpool*, 1873, p. 63, has the following notes:—"Moist places amongst the sandhills. Frequent. Much scarcer on the Cheshire than on the Lancashire side of the Mersey. About Ainsdale it is very abundant, making white large tracts of ground in the hollows of the sandhills. We have no inland localities recorded." Green (*Flora of the Liverpool District*, 1902, p. 54) says:—"Moist places among the sandhills; frequent." Several littoral stations, all in the Wirral peninsula, are cited, but, curiously enough, no reference is made to the Lancashire localities. The illustration (*op. cit.* fig. 209) represents the type rather than the sand-dune plant. In Lord De Tabley's *Flora of Cheshire*, 1899, p. 143, we read:—"Moist grassy vallies amongst the coast sandhills; moory elevated pastures, and upon the low moss-lands. . . . Is a great rarity in the plain of Cheshire." He cites Seaman's Moss Pits, Hale Moss, near Altrincham, and Pickmere Mere as stations in the moss-land, and as littoral localities, "New Brighton, 1837, Watson. New Brighton to Leasowe, but not very plentifully. About Leasowe it occurs in greater quantity, extending into the meadows south of the embankment." In the *Flora of West Lancashire*, 1907, p. 195, the following note occurs:—"The plant of the sand-dune tract has a distinct facies, owing to its numerous short stems and larger flowers." It will be noted that whilst *Parnassia palustris* occurs on the low-lying moss-lands of Cheshire, it is quite absent from the large areas of moss-land in West and South Lancashire probably because the soil is too peaty.

We have observed this littoral *Parnassia* for several years and, after a careful comparison with typical Grass of Parnassus from upland localities, we are of opinion that the characters which entitle it to varietal rank may be summarized thus:—

PARNASSIA PALUSTRIS L. var. CONDENSATA, nobis (var. nov.). A forma speciei normali in notulis sequentibus differt: Planta compacta humilior, 2·5–15 cm. Rhizoma plerumque superne furcato-ramosum, vel (in exemplis minoribus) simplex. Folia radicalia subcoriacea numerosa, brevius petiolata; petiolis laminâ paullum longioribus vel sæpe brevioribus. Scapi numerosi (4–20), breviores crassiores et rigidiores. Bracteæ folia subæquantes. Flores majores.

Habitat. Wet hollows of the sand-dunes on the coasts of Lancashire and Cheshire.

Plants low and compact in habit; rhizome in well-grown specimens often much divided at the crown, producing a tufted growth. Radical leaves crowded, with short petioles (usually but little longer than the lamina, frequently somewhat shorter). Scapes more numerous, shorter, stouter and stiffer than in the type. Bract placed low down, often among the radical leaves, or raised but little above them. Flowers larger, from 2·5–3·75 cm. Capsule larger. Flowering from mid-July to October.

The differences will be most readily understood by contrasting in tabular form the characters and relative proportions of the typical plant and the littoral variety:—

P. palustris Linn.	var. *condensata*.
Height 15–36 cm.	Height 2·5–15 cm.
Rhizome simple, or rarely forked.	Rhizome usually divided at the crown, except in young or starved plants.
Lamina of the radical leaves usually much shorter than the petioles.	Lamina of the radical leaves about as long as, and sometimes longer than, the petioles.
Bract conspicuously elevated above the leaves.	Bract immersed amongst, or only slightly exserted above, the leaves.
Scapes few (1–3). From 1 to 1·3 mm. in diam. In fruiting specimens they are slightly thicker, 1·4 being a good average.	Scapes many (4–20). Usually 1·5–1·6 cm. in diam., and in the fruiting state up to 2 mm.
Flowers 1·25–2·0 cm. in diam., sometimes 2·5 cm.	Flowers usually 2·5 cm., and frequently 3·75 cm. or more in diam.
Capsule described by Syme as being 0·9–1·2 cm. long.	Capsule from 1·2–1·6 cm. in length.

Although we have been unable to detect any distinct morphological feature distinguishing the littoral variety, the constant combination of the comparative differences noted confers upon it a distinct facies which is appreciated at first sight. Its compact clumps, with numerous low, stout, flowering-stems and large flowers produce a *tout ensemble* which is in striking contrast with that of ordinary *Parnassia palustris*, with its tall, slender, flexuose and mostly solitary stems, and smaller flowers. We have unfortunately not seen examples of *P. palustris* from the moss-lands of Cheshire, so that we do not know how they compare with the littoral plant. Specimens from lowland localities in Yorkshire (Askham Bogs, and the coast hills near Scarborough) agree in all respects with the type, and show no approach to the var. *condensata*.

The latter is evidently a maritime form, which has a parallel in the var. *arenaria* of *Pyrola rotundifolia* L., and, in our opinion, it is quite as worthy of recognition. Both plants, it may be added, grow side by side among the dunes of the Lancashire coast, other associated plants worthy of mention being *Salix repens*, *Orchis incarnata*, *Helleborine longifolia*, *Sagina nodosa*, *Samolus Valerandi*, *Monotropa Hypopitys*, *Anagallis tenella*, *Erythræa littoralis*, *Carex Œderi*, *Selaginella selaginoides*, *Amblyodon dealbatus*, *Meesia trichoides*, *Catoscopium nigritum*, *Bryum pseudotriquetrum*, *B. pallens*, *Brachythecium Mildeanum*, *Hypnum elodes*, *H. polygamum*, &c.

The influences at work in the production of this modification of type in *Parnassia palustris* have been under consideration, but we cannot at present enter into their discussion. It is, however, worth while calling attention to the fact noted by Kerner,* that in the alpine garden of the Blaser (alt. 2195 m.) the plant was only one-third to a quarter as tall as at Vienna, and *the flowers were also reduced* to nearly half the size. It is apparent that the var. *condensata* cannot be classed with the dwarf forms described from boreal and alpine situations.

Its distribution, as at present known to us, is: West Lancashire (v.-c. 60), South Lancashire (v.-c. 59), and Cheshire (v.-c. 58); all embraced within the limits of the Mersey province of Watson.

Our thanks are due to Dr. F. N. Williams for kind assistance in drawing up this paper.

SHORT NOTES.

HELLEBORINE *v.* EPIPACTIS. — In the recently published (thirteenth) volume of the *Flore de France* M. Rouy retains *Epipactis*, apparently because Hill's genus *Helleborine* also included *Cephalanthera*, and because Persoon (Syn. ii. 512, 1807) used *Helleborine* for *Serapias*. But *Helleborine* had already been established by Hill and other writers. Moreover, *Epipactis*

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* *The Natural History of Plants*, Kerner & Oliver, 1902, vol. ii. p. 509.

Adanson, as I have said (Journ. Bot. 1908, 8), was one of the most inchoate genera ever proposed, the characters on which it was based being such as are common to the greater part of the order *Orchidaceæ*. Furthermore, the name *Epipactis* had already been employed by Haller (Stirp. Helv. 277, 1741) for the genus afterwards named *Goodyera* by Salisbury, which Boehmer revived in 1760, *i. e.*, prior to the publishing of *Epipactis* in another sense by Adanson in 1763, or by Crantz in *Stirpes Austriacæ*. M. Rouy writes: "*Epipactis* (Adans.), R. Brown ap. Aiton, Hort. Kew. v, 201, 1813." But Brown's genus *Epipactis*, like Hill's *Helleborine*, also includes plants which subsequently L. C. Richard (Mém. Mus. Paris, iv. 51, 1818) named *Cephalanthera*, and is thus, equally with Hill's genus, to be cited as "pro parte." Some modern writers, for instance, Eaton (Proc. Biol. Soc. Washington, xxi. 628) and Wettstein, have again, but, as I think, without sufficient reason, united them. It would seem from this that the entangled history of this genus has not been completely investigated by M. Rouy, since the reasons which he assigns for the course he follows appear not to be tenable. It may be added that M. Briquet (*Flore de Corse*, 385, 1910) uses the name *Helleborine* in the sense I suggested, and says very truly: "Il n'y a cependant pas là une raison pour rejeter ce nom (Régl. Nom. Art. 44). Il a d'ailleurs été de même pour Adanson, dont le genre *Epipactis* embrassait aussi, outre le *Epipactis*, sensu stricto, les *Cephalanthera* Br., *Listera* Br., *Goodyera* Br., &c." The name *Helleborine* (Tourn.) Hill, Brit. Herb. 477 (1756) should therefore undoubtedly be adopted.—G. Claridge Druce.

Damasonium Alisma and Elisma natans in Yorkshire?—Mr. J. Fraser Robinson in his *Flora of the East Riding of Yorkshire*, p. 193 (1902), records *Damasonium Alisma* Mill. as "seen frequently in the seventies by the late Mr. E. A. Peak and Mr. T. Dennis, near Stoneferry, Hull. Not seen of late in this station, but the pond and dyke still exist, and probably also the plant." I have tried to ascertain if any specimens exist, but cannot get any information as to these. The northern limit of the plant in Europe seems to be Moscow in Russia (Stephans, Fl. Mosq. No. 248, 1792), and Lake Bogdo in mid-east Russia (as var. *trinerve* Trautv.), in both which stations the cold is much more severe in winter and the summer hotter than in Yorkshire. The next most northern station seems to be Ellesmere, in Shropshire (52°, 55′ N. lat.). The York station may thus be a certain record, but can hardly be accepted as such unless the plant be refound there, or specimens be found in herbaria. The Russian stations are exceptional, as the distribution in Europe is decidedly southern; *i. e.* Spain, Portugal, France, Italy, Sicily, Malta (Duthie in Herb. Kew!), Sardinia, and Watson adds Dalmatia; Caucasus (Lenkoran); Marocco, Algeria, and Egypt; West and Central Asia. The "Mr. Peak" mentioned was superintendent of the Hull municipal parks. Another East Riding species needs confirmation; *i. e.*, *Elisma natans* Buch. "Lake at Hornsea, Teesdale." Teesdale, in a note in Bot. Guide, p. 685 (1805), expresses doubt as to its occurrence; in fact, this species needs refinding in several recorded counties before it can be accepted for them.—Arthur Bennett.

Orchis hircina in Kent.—This plant was found this year on the downs near Shoreham, Kent, during an ecological excursion of the members of the School Nature Study Union. The plant was in bud, but the unfolding of the lowest bud of the inflorescence showed unmistakably what it was. It was growing some yards from the edge of a wood and, unfortunately, only a couple of feet from the footpath. The plant was photographed in its then condition and left for further development. It may, on account of its nearness to the footpath, be taken by any passer by merely as a curiosity.—Robert Paulson.

[A specimen from Great Chart, near Ashford, in the same county was collected on June 19 by Mr. A. E. White, of Ashford, and sent to the National Herbarium. It was recorded by Edward Newman from "between Shoreham and Farningham" in 1852 (see *Phytologist*, iv. 417).—Ed. Journ. Bot.]

Trigonella ornithopodioides DC. in Herefordshire.—Mr. A. J. Crosfield sent to me, on June 21st last, a plant of this species, gathered in the parish of Colwall, just within the Herefordshire boundary, and on the following day pointed out several others growing there. This discovery is of considerable interest, as for several years it has been sought for unsuccessfully in Herefordshire, although occurring abundantly on the commons at the eastern bases of the Malvern Hills, and, in smaller quantity, on the flank of the Herefordshire Beacon, but within the Worcestershire boundary. I think that it has spread from the plain upwards and passed into Herefordshire by the gap which occurs at this point.—Richard F. Towndrow.

Ranunculus ophioglossifolius Vill. in Gloucestershire.—This plant, which is now extinct in its one Jersey station, and which was recorded from East Gloucester (near Cheltenham) in this Journal for 1890, p. 282, was there in excellent condition this year, though I believe not in the original station. Can further light be thrown on the Rev. W. R. Linton's locality "by the Severn," or on Messrs. Groves's Hampshire station ?—G. C. Druce.

Lythrum Hyssopifolia in Rutland.—This little county has a rich flora. I have lately received a specimen of *Lythrum Hyssopifolia* L., collected in 1910 by the Rev. E. R. Walker, of Brookleigh, Barrowden, Stamford, in that parish on the flats by the Welland River.—E. Adrian Woodruffe-Peacock.

Scilla campanulata Ait. (1789) (p. 216).—Under its earlier name *S. hispanica* Mill (1768) this is recorded in Journ. Bot. 1910, 200, from Cothill, Berks. It occurred under the hedge of a small pasture near the mill, and in a hedgerow in the vicinity, where I found it in 1909.—G. C. Druce.

Fumaria densiflora DC. in Worcestershire.—I met with this species in the parish of Welland, near Malvern, on June 25th last. It was growing, in fair quantity, with *F. Borœi* and *F. officinalis* in a wheat-field.—Richard F. Towndrow.

A Correction (p. 225, footnote †).—Dr. Daydon Jackson points out that it was Dillenius who amplified the description in Ray's *Synopsis*, ed. 3, and altered the naming; the last sentence should therefore run: "Dillenius, however, in the third edition of R. Syn. Stirp. Brit. p. 326 (1724) adopts," etc. It will be noted that the page and date are also corrected.

REVIEWS.

Prodromus Floræ Britannicæ. Part 9, comprising the fourteen Families included in the four Orders of Rhamnales, Gruinales, Hippocastanales, and Tricoccales. By Frederic N. Williams. 8vo, pp. 477–532. Stutter, Brentford, March, 1912. Price 2*s.* 6*d.*

The ninth part of Mr. Williams's *Prodromus* contains the numerous small orders of Choripetalæ; these are treated in the individual manner characteristic of Mr. Williams's work, which, while adding to its interest, renders it difficult to discover the general principles on which he proceeds. An example of what we mean will be found if the very elaborate treatment of *Callitriche* in the present issue be compared with the cavalier method applied to *Mentha* in an earlier part. In the admission or rejection of species, again, he is difficult to follow; the present part includes the Horse-chestnut, on the ground that it "is such a conspicuous feature of the tree vegetation in many parts of the country that it can scarcely be omitted from our account of British plants." *Impatiens biflora* and *I. parviflora* are included, but the equally well-established *I. glandulifera* (see Journ. Bot. 1900, 87, 278; 1901, 187) finds no place; neither *Oxalis corniculata* nor *O. stricta* are so much as mentioned, though the former has certainly been at least naturalized in the West of England for considerably more than a century (see Journ. Bot. 1900, 31).

Mr. Williams's conclusions, whether as to plants or nomenclature, are not likely to pass unchallenged; the former are indeed, as Mr. Bennett's note on *Polygala vulgaris* var. *grandiflora* in our last issue (p. 229) shows, are already under criticism; and a paper in our present issue shows good reason for not accepting his proposed substitution of *Linum hispanicum* Mill. for *L. angustifolium* Huds. Nor is his style always conducive to clearness: thus, of a plant which he places (p. 522) with the *Polygala* mentioned above, he says, "Haussknecht seems to have overlooked the specimens, as they appear afterwards as the type for *P. vulgaris* var. *pindicola* of the same gathering"; this seems to us to indicate that Haussknecht considered the specimens in question distinct from var. *grandiflora*, in which case he would naturally not refer to them under that plant.

An example of the different value set by different botanists on the same plant is afforded in the case of the form of *Rhamnus* *catharticus* described by Mr. Druce (Rep. Bot. Exch. Club, iii. 1, 16) in somewhat curious Latin as a new variety (var. *Schroeteri*) but dismissed by Mr. Williams as "a farinose form."

In matters of arrangement, nomenclature, spelling, and other details, Mr. Williams follows the course adopted in previous parts of his work, which is not that pursued by most botanists and does not, we think, tend to convenience. His notes on the species are however always extremely interesting and show an amount of literary and historical research which no other similar work presents; and on this account alone his *Prodromus* is worthy of consultation by all British botanists.

Hortus Mortolensis: Alphabetical Catalogue of Plants growing in the Garden of the late Sir Thomas Hanbury, K.C.V.O., F.L.S., at La Mortola, Ventimiglia, Italy: compiled by Alwin Berger, Curator of the Garden. 8vo, cloth, pp. xxiv, 467. Plates and portraits. London: West, Newman & Co. Price 5*s*.

In this well-printed volume we have an adequate account of the celebrated Garden which has for many years been a place of pilgrimage for the botanists of Europe, and has attained a world-wide celebrity for the variety and interest of the plants of divers countries which find a home therein. The work built up during the last forty years of his life by Sir Thomas Hanbury has been carried on with unabated interest since his death in 1907 by his widow and son, aided by the competent botanist who acts as curator of the garden and to whom we owe the volume under notice, wherein for the first time is given a complete catalogue of the treasures it contains.

The book however is something more than a catalogue, as the catalogue itself is more than a bare enumeration. Under each genus is given a reference to its position in Engler & Prantl's *Pflanzenfamilien*, and for each species is given in shortened form, the interpretation of which is not always quite obvious but is duly explained in the list of abbreviations, a similar reference to some standard and fairly accessible work. Following the catalogue proper come nearly one hundred pages of notes, dealing with the origin and history of the plants in the garden, their position as regards health and permanence, points relating to their culture, and descriptive notes which include descriptions of some novelties —*Agave Frederici*, *A. mortolensis*, n. hybr., *Aloe Straussii*, *Sphæralcea speciosa*—and two other new names—*Agave calodonta* (for *A. Scolymus* Berger non Karwinski) and "*A. ingens* nom. nov." This latter is proposed for what Mr. Berger calls "the normal green type of the species," first discovered by him "on rocks at La Mortola, where it had grown from seeds of the variegated form" described as *A. picta* by Salm-Dyck, who had not seen the green plant; we are inclined to doubt whether the new name can stand, as it appears to us that *A. picta* must be retained for the species, the recently discovered form standing as a variety. Among the most interesting of the notes are those on the *Cac-*

taceæ, *Crassulaceæ*, *Ficoideæ*, and *Aloineæ*, groups in which the garden is particularly strong and on which Mr. Berger has published important memoirs.

An account of the gradual development of the Garden since the purchase of the estate in 1867 is prefixed to the work; an interesting drawing by Daniel Hanbury, showing its appearance at this time, is reproduced, with the same view at the present time, showing the marvellous development of vegetation. There are portraits of Sir Thomas and of his brother Daniel, the eminent pharmacographist, who took the greatest interest in the Garden until his death in 1875, introducing from various localities plants, especially those of economic importance, which still flourish there. A list of the contributors to the Garden, who in turn have profited by its treasures, shows that every part of the globe has been laid under contribution.

The work throughout has been executed with the greatest care, and reflects much credit upon Mr. Berger, who is to be congratulated on the use he has made of the material generously placed at his disposal by Lady Hanbury and Mr. Cecil Hanbury.

Bref och skrifvelser af och till Carl von Linné: med understöd af Svenska staten utgifna af Upsala Universitet." Första afdelning, Del vi. Pp. 445. Stockholm (Aktiebolaget Ljus). 1912.

The sixth volume of this admirable and monumental series of volumes containing the letters to and from the great Swedish naturalist is before us, and is brought out on the same plan as its predecessors; see this Journal for 1911, pp. 278–9. Swedish writers, whose names extend from Ehrenpreus to Hallman, are included in this instalment, and it so happens that we meet with fewer letters from Linné himself than in earlier parts. It follows, therefore, that we have a larger number of his pupils and other correspondents reporting to him their experiences on their travels and the like than usual. Of the more prominent we may mention Johan Peter Falck, at one time tutor to the younger Linné, but whose extant letters are solely from St. Petersburg; Bengt Ferber, who tells Linné that even so late as the year 1759 the daughter-in-law of G. Clifford, his former patron, is still angry with Linné for having enticed the gardener Nietzel from Amsterdam to Upsala (more than twenty years before); Pehr Forsskål, as written by the traveller himself, twenty-seven letters in all; Henrik Gahn, with news from London; Johan Otto Hagström, the bee-master, who, in the last letter from his former professor, is called affectionately "My good old friend"; and the most copious of all, Daniel Zachariæ Hallman, with nearly thirty long letters. The last was Legation chaplain in Madrid from 1754 to 1757, and thus became acquainted with the same set of Spanish botanists as Alströmer and Löfling.

We get a momentary glimpse of Isaac Lawson in a letter dated from London, November 23rd, 1759, from Bengt Ferber, in which he says, "Dr. Lawson, who studied with the Archiater

[Linné] in Leyden, sends his compliments," which proves that he was living more than twenty years after he had joined with Gronovius in printing the first edition of the *Systema Naturæ.*

B. D. J.

BOOK-NOTES, NEWS, &c.

The method of research by growth experiments has had for one result the addition to the fungus-flora of a very large number of species. Many of the moulds are polymorphic, and some change in nutrition, &c., at once induces a corresponding change of form in the fungus. Dr. Richard Westling (*Ueber die Grünen Spezies der Gattung Penicillium*; Arkiv för Botanik ii. n. 1: Upsala, 1911), however, considers that he has avoided the danger of mistaking growth forms for species by selecting the spore-size as his standard character, since this is, he finds, unaffected by altered conditions. The old familiar *Penicillium glaucum* is only one of many green forms. Westling has verified, by culture and otherwise, forty-four allied species; some fourteen species he has accepted as good, while seventeen species have been rejected as imperfectly described, &c. Most of the species are illustrated by text-figures. The monograph will be indispensable to all future students of *Penicillium.*—A. L. S.

The recent number (June 29) of the *Journal of Genetics* contains two botanical papers. Mr. W. Neilson Jones, of University College, Reading, treats of "Species-Hybrids of *Digitalis*," which are contrasted with the phenomena exhibited by *Œnothera*; this is illustrated by numerous diagrams and by three plates, one in colour—the colour-plates of the Journal are always of remarkable excellence. Dr. Keeble writes on "Gigantism in *Primula sinensis*," which he contrasts with observations already published on the same phenomenon in other plants; this also is fully illustrated. The general get-up of the Journal leaves nothing to be desired.

The last number (June 28) of the *Journal* of the Linnean Society (Botany) is entirely occupied by an elaborate "Investigation of the Seedling Structure in the Structure in the *Leguminosæ*," illustrated by nine plates, by Mr. R. H. Compton, Junior Demonstrator of Botany in the University of Cambridge.

No. 3 of the third volume of *Contributions from the Botanical Laboratory of the University of Pennsylvania* contains the description (with plates) of *Nepenthes Merrilliana* and *N. truncata*, two new species from the Philippines, by Dr. Macfarlane; also papers on "Leaf-Movements in the *Oxalidaceæ*," by E. B. Ulrich; on "Bacteria and other Fungi in Relation to the Soil," by Dr. D. Rivas; on "The Seedling of *Commelina communis*," by Martha H. Hollinshead; and a long report on the "Phytophenology" of Philadelphia by Dr. Marian MacKenzie.

The new number (Part 5) of the *Transactions of the British Mycological Society* completes the third volume, of which a very full index is included. There are the usual features:—an account of the Spring (Teesdale) Foray and of the Autumn (Taunton) Foray, giving a full list of fungi and Mycetozoa found on those occasions; lists of new and rare fungi, the micro-fungi by Miss Lorrain Smith and the larger ones by Mr. Carleton Rea; and the Presidential Address, which this year was delivered by Prof. E. S. Salmon, on "Economic Mycology and some of its Problems." Another paper, read by Mr. H. Wager at the British Association Meeting last year on "The Study of Fungi by local Natural History Societies," is included. The veteran French mycologist, Boudier, writes a note on *Pseudophacidium Smithianum*. Miss A. L. Smith writes on *Xylobotryum* and Mr. A. D. Cotton on the structure and systematic position of *Sparassis*. There is an amusingly pathetic paper by T. Petch, making havoc of the tropical records of European fungi. Prof. Buller gives an account of his work on the production and liberation of spores in the genus *Coprinus*, and Mr. J. Ramsbottom gives an account of work published during 1911 on the cytology of fungus reproduction. The editor, Mr. Carleton Rea, has a useful paper on "British Geasters," which is illustrated by three excellent coloured plates by Mrs. Rea, who also contributes another coloured plate, illustrating the fungi new to science and some of the more interesting of the year's records. As evidence of the progress made by the Society, it is interesting to note that the present volume contains as many pages as the first two volumes combined, and that the number of active members now exceeds one hundred.

Mr. R. T. Günther has published, through Messrs. Parker & Son, of Oxford, a pretty volume (price 6*s.*) on *Oxford Gardens*, "based upon Daubeny's popular guide to the Physick Garden of Oxford, with notes on the Gardens of the Colleges and on the University Park." It is a little disappointing to learn at the outset that there are no old official records in the possession of the Professor of Botany, but Mr. Günther in his introduction has brought together a very interesting and complete account of the Garden, some of it drawn from unfamiliar sources. The main part of the book is occupied by a description of the Garden at the present time, with copious notes on its more remarkable features. Some of Mr. Günther's observations seem rather uncalled for: *e.g.* "there is no end to the confusion introduced into scientific nomenclature by the ignorance or jealousy of 'scientists' over the water" (p. 35). The note under *Oxalis Acetosella* on the Shamrock is curious: it runs thus—"The Wood-sorrel is stated to be the original of the Irish Shamrock, but owing to the fact that it is not available as early as St. Patrick's Day, *Medicago lupulina* is worn instead in Dublin." Now the tradition which connects St. Patrick with the Shamrock has no relation to St. Patrick's Day; and the plant almost universally worn on that festival in Ireland is not *M. lupulina* but *Trifolium minus*, as Mr. Colgan has conclusively shown. The notices of the college gardens contain much of interest—*e.g.* the records extracted from the accounts of Magdalen College, which begin with its enclosure in 1466. The book is prettily printed and nicely illustrated, and is thoroughly well done.

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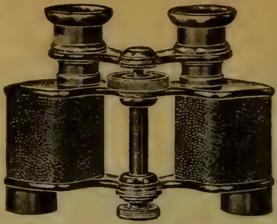

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Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains. In 1896 it became necessary to increase the size of the Journal, owing to the number of papers sent for publication: the number of plates was at the same time augmented.

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NOTES ON THE FLORA OF SHETLAND,

WITH SOME ECOLOGICAL OBSERVATIONS.

By William West, F.L.S.

These notes only apply to a part of Shetland and by no means pretend to be exhaustive of that part; they do, however, fairly represent what can be generally observed through August in that district which was investigated. A great part of Unst was examined, the district about Ollaberry, that between the latter place and Hillswick, that part of Ronas Hill between its summit and Ollaberry, and a very small part of the district between Lerwick and Scalloway.

The geological formation of those parts visited is Precambrian and metamorphic, schists being prevalent. A broad band of Serpentine passes through the length of Unst. In the north of the mainland, north-west of Ollaberry, there is a great mass of red granite, whose highest point is on the somewhat flat-topped Ronas Hill, at an elevation of 1475 ft.

There is much moorland, some of which is enclosed but much more is unenclosed, and in some places partial drainage and grazing has altered its original character in varying degrees. Other enclosures which may be termed fields have been drained still more, and have also been grazed on oftener; these are in a transition stage between moorland and pasture. In a few fields near the farms, oats (the variety with an extra long awn) and potatoes are grown, and in some cases cabbages also. The oats were still green near the end of August, a condition I have noticed before at still later periods of the year in Lewis and Harris.

There is a total absence of native trees, as in the Outer Hebrides, Clare Island, &c., hence the absence or scarcity of shade plants. A resident told me that one or two plants of *Pyrus Aucuparia* were said to occur in ravines, but I saw none in those I visited.

The summer temperature is comparatively low with cold winds, especially after sunset. One of the most striking features is the total absence of many common British plants and the scarcity of many others. When looking at a bare list of the plants occurring in a district like this, one can easily form erroneous ideas as to the frequency or otherwise of the species enumerated. To illustrate what I mean, I will mention a few out of many; I only found *Vaccinium uliginosum* on one elevated tract in Unst—it may occur on the opposite side of the Voe which reaches a higher elevation, and to which the weather hindered my intended visit—it is very local, though fairly abundant where it occurs. *Arctostaphylos Uva-ursi* I only found in one very stony place, though there it was quite profuse on account of the suitable physical and edaphic conditions. A solitary plant of *Gnaphalium sylvaticum* in a pasture was the only one seen during the month. Also but one specimen was seen of a few other plants, such as *Luzula spicata*, *Juncus trifidus*, and *Juniperus sibirica*. *Pteris aquilina* was scarce and dwarfed; it was only observed in two sheltered places, in one of which there were but few plants, in the other it was locally abundant. Many other common plants were only noted in small quantity in one place, such as *Heracleum Sphondylium* and *Tussilago Farfara*, some in two places, and these were evidently introductions. One undoubted introduction, *Matricaria suaveolens*, was abundant near the landing-place at Baltasound; this is rapidly spreading in the manufacturing districts of Yorkshire, especially in sandy soils.

The number of vascular plants marked off in a catalogue on the spot during August was 233, consisting of 221 species, 4 varieties, and 8 bracketed as certainly planted. Not counting the 8 last mentioned, 51 of these species and 1 variety were seen only in Unst, 37 species and 1 variety only on Mainland, and 133 species and 2 varieties in both Unst and Mainland; 9 of those seen on Mainland were only noticed between Lerwick and Scalloway. This shows that 187 of these were noted for Unst and 173 for Mainland.

The truly vernal plants had mostly vanished. The presence of alpine and even Arctic plants at 50 to 100 ft. above sea-level is a marked feature, such as *Silene acaulis*, *Arabis petræa*, the nigrescent form of *Cerastium arcticum*, *Thalictrum alpinum*, *Draba incana*, &c. Edaphic influences were very marked, some plants being abundant on, and others confined to, the Serpentine. For instance, *Selaginella selaginoides* was strikingly abundant on this formation everywhere, so much so, that in some places the distance of the tufts from each other varied from 3 to 6 in., in others from 9 to 12 in. *Statice Armeria* (not seen at all near Ollaberry) and *Thalictrum alpinum* were quite absent on all the granite I visited, even at an elevation of 1470 ft., but at low elevations they were both common on the Serpentine. Even *Linum catharticum* was not noticed about Ollaberry either on the schist or the granite. Other plants, such as *Gyrophora torrefacta*, *Platysma triste*, *Parmelia lanata*, *Hedwigia ciliata*, and others, were all confined to the granite. The very rare *Arenaria norvegica*, *Cerastium arcticum*, a peculiar rigid and nigrescent form of *C. vulgatum*, *Plantago maritima* v. *lanata*, and others, were also restricted to the Serpentine.

Another feature was the abundance of certain plants in some districts and their total absence in others; as an example, *Gentiana campestris* was in great profusion in Unst and quite absent from the district about Ollaberry in the north of the Mainland. There is a very marked influence of cold winds—in the more exposed places—on the stature and state of plants; all the *Festuca ovina* was viviparous, even at about 120 to 140 ft. above sea-level. *Molinia cærulea* was about 6 in. high but often less; *Rhinanthus Crista-galli* and *Linum catharticum* were often unifloral and but 2 to 3 in. high; *Carex flava* varied from 1 to 2 in. in length; *Scabiosa succisa* stood about 3 in.; there were plenty of dwarf plants of *Lotus corniculatus* with but one fruit, and many tiny plants of *Prunella vulgaris* with often only one verticillaster.

Cochlearia alpina was also in full fruit on plants 1 to 2 in. high.

In some of these flatter areas of Serpentine, where the rock seems to weather rapidly, the percentage of bareness (*areas without any plants*) was about eighty, that of the plants about twenty; it is here where most of the rarer alpine plants occurred. The fertile spikes of all the sedges but *Carex flava* were somewhat nigrescent, some markedly so, the plants themselves being very dwarfed. This area was also practically destitute of Muscineæ; the only Bryophytes noticed were a small *Trichostomum*, a form of *Webera nutans* with tiny patches of *Rhacomitrium lanuginosum*, and these were near small abutting stones.

A very noticeable feature on some of the wind-swept moorlands was the dominance of *Rhacomitrium lanuginosum* (*Grimmia hypnoides*), beds of the old plants often forming a mat of a foot or more in thickness; in *dry* weather these tussock-like masses could be easily recognized a thousand yards away. The somewhat larger size and deeper colour of the flowers of *Lychnis dioica* were very marked, and reminded one of Norwegian forms.

Particular notice was taken of two very small planted woods, one in Unst, the other on the Mainland. *Acer Pseudo-platanus* was the chief tree planted, but on the border there were one or two plants each of *Ulmus campestris*, *Pyrus Aucuparia*, *Cytisus Laburnum*, one plant each of *Fraxinus excelsior* and *Symphoricarpus racemosus*, and in one of the woods a species of *Salix*, like a broad-leaved *viminalis*. For protection from the wind a wall had been built around them, but above the line of the wall the wood became pulvinate, after the style of the gorse and heather on wind-swept tracts, as on the high parts of Anglesea south of Holyhead. Many of the leaves were curled and brown at the edges. Above this compact cushion-like mass small dead branches of *Acer* were projecting (as seen at a little distance). The trees bore in abundance some of those crustaceous corticolous lichens, which are able to live in such situations, on their very shaded trunks, such as *Opegrapha atra*; this shows without much doubt that the spores of lichens must be carried great distances by the wind.

Some Plant Associations.

To give an example in some detail of an association, some extent of the Serpentine in Unst at 130 to 150 ft. elevation, which was fairly well covered by a turf, was carefully examined with the following result; the numbers apply to percentages:—*Thymus Serpyllum* (16), grasses, mostly viviparous *Festuca ovina*, dwarf *Agrostis* and *Molinia* (12), *Calluna* (8), *Linum catharticum* (7), Carices, mostly *glauca* and *panicea* (6), *Selaginella* (5), *Plantago maritima* var. *lanata* (4), *Scabiosa succisa* (about 3 in. high) (4), *Rhinanthus* (only 2 to 3 in. high) (3), *Thalictrum alpinum* (3), *Scilla verna* (2)—the rest, in smaller quantities than the above (30). It consisted of scattered and very dwarf plants of *Sieglingia*, *Anthyllis*, *Habenaria viridis*, and a few others in less quantity still, often odd plants, such as unifloral *Potentilla Tormentilla*, *Antennaria dioica*, *Polygala serpyllacea*, *Hypericum pulchrum*, *Gentiana campestris*, *Viola Riviniana* in fruit (1 to 1½ in. high), *Euphrasia latifolia* (1½ in. high), *Carex pulicaris* (near small rocks), &c. As to abundance of plants in this area with regard to the number of individuals, dwarf *Linum catharticum* certainly held sway. Scattered over this area in very limited quantity—where nothing else was growing—was a peculiar dwarfed variety of *Rubus saxatilis*; it had often but two dark green rugose leaves on each shoot. One or two withered flowers were found after a long search, and after a still further search, a very abbreviated long shoot was found. Its habit and general character are worthy of a varietal name.

As it got bleaker higher up the slope at about an elevation of from 180 to 200 ft., the turf became scarcer until the bareness was about 80 per cent. The 20 per cent. area was occupied as follows in a scattered formation:—*Plantago maritima* var. *lanata* (4), *Thymus Serpyllum* (2), *Statice Armeria* (1), *Agrostis tenuis* (1); the remaining 12 per cent. was taken up by *Cerastium arcticum* (nigrescent), *Arenaria norvegica*, *Cerastium vulgatum* (a nigrescent form), *Arabia petræa* (with rosy petals), *Festuca ovina* (viviparous), *Carex Goodenowii* (with nigrescent perigynia), *Silene acaulis*, *S. maritima*, dwarfed plants of the following—*Linum catharticum*, *Rhinanthus*, *Scilla verna*, *Antennaria dioica*, *Euphrasia latifolia* (white-flowered), *Sagina nodosa*, *S. procumbens*, tiny bits of *Calluna*, and in slight depressions *Erica Tetralix*, *Habenaria viridis*, with three leaves spread out rosette-like on the soil, *Anthyllis Vulneraria*, and *Rumex Acetosa*. *Hygrophorus coccineus* was present in one place. Where the rocks had not weathered so fast, little bosses stood out, and on and about these were *Aira præcox*, *Cerastium tetrandrum*, often not more than 1 in. high, with well-developed congested cymes in full fruit, and very dwarfed *Draba incana*.

Still nearer the low hill-top (the highest point was under 290 ft.), the turf became scarcer still, and there was quite 90 per cent. of bareness; the following plants still struggled to hold the ground:—*Agrostis vulgaris*, *Carex* (barren), *Plantago maritima* var. *lanata*, *Scilla verna*, *Selaginella*, *Thymus Serpyllum*, *Viola Riviniana*, *Prunella vulgaris*, *Antennaria dioica*, *Linum catharticum*, *Potentilla sylvestris*, *Scabiosa succisa*, *Festuca ovina* (viviparous), and just a trace of *Calluna* and *Lotus corniculatus*. The *Viola* was often attacked by *Puccinia Violæ* Schumann, and the *Euphrasia* by *Coleosporum Euphrasiæ* Schumann.

This Serpentine yields chromic iron, and it is possible that in some parts of the area there may be some harmful constituents of the weathered rock which inhibit the growth of many plants, and also hinder the ground from being fully occupied by those that attempt to cover it, and if this be so, it may also serve as an ally to the bleakness of the place in augmenting the dwarfing of the plants.

The nigrescence noticed in some of these plants of cold regions is probably due to the survival of those which may have adopted this habit by gradually accumulated melanic variations. As instances of this nigrescent tendency, take the cases of some of the alpine mosses, Hepaticæ and Lichens. One cannot but notice when working in alpine districts the blackness or brownish blackness of all the species of *Andreæa*. Many of the alpine species of *Grimmia* and *Rhacomitrium* are blackish, such as *Rhacomitrium ellipticum*, *Grimmia atrata*, *G. elongata*, &c. Many other species of *Grimmia* have their lower portions of a dark colour. The following alpine and subalpine Hepaticæ are also black or blackish brown:—*Nardia alpina*, *N. ustulata*, *N. Funckii*, *N. adusta*, *N. emarginata*, *Herberta adunca*, *Ptilidium ciliare*, *Mastigophora Woodsii*, *Gymnomitrium crenulatum*, *G. coralloides*, *G. crassifolium*, &c. Lichens often show this tendency, to wit—many species of *Gyrophora* and *Umbilicaria*, *Parmelia lanata*, *P. olivacea*, *P. fuliginosa*, *P. omphalodes*, *P. triste*, *Platysma tahlunense*, *Cetraria aculeata*, &c. Even the black *Verrucaria maura* and its dark commensals or near neighbours *Lichina pygmæa* and *L. confinis* may have attained their darkness by thus being able to absorb more heat to counteract the coldness produced by the almost constant evaporation from their surfaces. Then, again, the black *Racodium rupestre* and *Cænogonium* always grow in deep shade, and they will also be able to utilize what heat they may get with the light they receive. The species of *Ephebe* are also alpine and black, and the colour is due to the much greater prevalence of the algal constituent. This genus of algæ (as well as some species of the allied genera), when alpine and autonomous, become blackish brown in colour and probably from the same reason.

Another tract of the Serpentine in Unst was examined about two miles distant from the last and further from the sea; it was walled in and used as pasture for the ponies. In some places *Calluna* only persisted in cushions from 3 to 6 in. high and about 12 in. across; these were markedly mingled with varying proportions of *Molinia*, Carices (barren), *Potentilla Tormentilla*, *Festuca ovina*, and with smaller quantities of *Scabiosa succisa* (only leaves), *Thalictrum alpinum*, *Scilla verna*, *Statice Armeria*, *Plantago maritima*, and *Agrostis tenuis*. The plants of the rest of the turf (which had small areas of bareness) surrounding the *Calluna*-cushions were a mixed formation of *Agrostis vulgaris*, *Leontodon autumnalis*, *Luzula campestris*, *Festuca ovina*, *Rhinanthus*, *Potentilla sylvestris*, *Selaginella*, *Statice Armeria*, *Erica cinerea*, *E. Tetralix*, *Juncus acutiflorus*, *Cerastium triviale*, *Plantago maritima*, *Prunella*, *Gentiana campestris*, *Scabiosa succisa*, *Linum catharticum*, *Sieglingia*, and in the moister places very dwarfed *Schœnus nigricans*, *Sagina nodosa*, small patches of barren *Narthecium*, *Plantago maritima* var. *lanata*, *Euphrasia latifolia* (with white flowers), *Pinguicula vulgaris*, *Carex pulicaris*, *C. dioica*, *C. echinata*, in barer places *C. flava* and odd plants of *Holcus lanatus*. Where rocks abutted slightly *Antennaria dioica* occurred with *Silene acaulis* now and then, and on the rocks were *Sphærophorus coralloides*, *Cladina sylvatica*, *C. pungens*, *Lecanora parella*, fragmentary *Lecidea atrata* (and poor examples of one or two more species of

Lecidea hardly determinable), *Physcia aquila*, *P. parietina*, *Collema* sp. (on the soil in crevices), *Ulota phyllantha* and *Homalothecium sericeum.* Lichens and Muscineæ were anything but plentiful on the rocks of this formation on account of its rapid weathering.

An extensive part of the moorland in the west of Unst was very carefully examined with regard to the relative proportion of species. The land was at an elevation of between 200 and 300 ft., in some parts it was flattish, the rest gently sloped to the Atlantic. The approximate percentage numbers of the species were: *Rhacomitrium lanuginosum* [= *Grimmia hypnoides*] (60), *Calluna* (20), *Eriophorum polystachion* (10), *Empetrum nigrum* (4), *Erica cinerea* (2), *E. Tetralix* (2−), *Narthecium* (2+); *Drosera rotundifolia* was very scarce. *Cladina sylvatica* was sprinkled amongst the *Rhacomitrium*, and now and then increased into patches. *Cladina uncialis* occurred here and there, and forms of *Cladonia furcata*. *Sphagnum acutifolium* occasionally was present in small quantity, and *S. cuspidatum* in hollow places. Small patches of *Campylopus brevipilus* was on the bare soil now and then. Rocks abutted irregularly, and about these was *Sphærophorus coralloides*, and on them grew a great abundance of *Parmelia sulcata*, with a very much smaller proportion of *P. physodes*, and here and there various forms of *Lecidea contigua*.

As the relative proportion of the floral constituents often changes very rapidly on the same geological formation, I made a careful examination at a fair distance from the last place, at about the same elevation and with about the same aspect; there was nothing on the surface to indicate any difference in soil, the only difference was that it was all a gentle slope without small flattish areas. The *Rhacomitrium* had practically disappeared. The constituents were approximately as follows:—*Agrostis tenuis* (18), *Calluna* (12), *Festuca ovina*—mostly viviparous (12), *Aira flexuosa* (7), *Juncus squarrosus* (6), *Luzula congesta* (6), *L. sylvatica* (3), *Potentilla sylvestris* (3), *Hylocomium loreum* (4), *Polytrichum commune* (4), *P. juniperinum* (3), *Hypnum cupressiforme* (3), *Thuidium tamariscinum* (2), *Cladonia*—several species (2), the rest, bareness (15). This shows—as I have often noticed—how difficult it is to colour a phytogeographical map correctly in *every* district except on a very large scale.

The flattish top of another moorland south of Baltasound, three or four miles from the last moor, was examined, and found to be occupied with the following:—*Rhacomitrium lanuginosum* (70), *Calluna* (20), *Erica cinerea* (4), and a mixed formation (6) of *Festuca ovina*—viviparous, *Plantago maritima*, *Potentilla sylvestris*, *Empetrum*, *Agrostis tenuis*, with odd plants here and there of *Carex* sp. (cropped, probably *binervis*), *C. pilulifera*, *Thymus Serpyllum*, *Viola canina* (badly attacked by *Puccinia Violæ*), and the large flowered form of *Aira flexuosa*. As one proceeded down the slope the *Rhacomitrium* diminished (60), so did the *Calluna* (15), the *Erica cinerea* increased (15), the rest (10) consisted of those plants under "(6)"—a few lines above—with the addition of

Antennaria dioica, *Erica Tetralix*, *Carex pulicaris*, *Linum catharticum*, *Selaginella*, *Pinguicula vulgaris*, and one or two plants here and there of *Narthecium*, *Nardus*, *Molinia*, dwarfed *Hypericum pulchrum*, and *Leontodon pratensis*. On the abutting rocks were *Ulota phyllantha*, *Lecidea rivulosa*, *L. contigua*, *Pertusaria dealbata*, and *Lecanora parella* var. *gyrocheila*.

Near Baltasound a field was noticed which had evidently been under the plough at some time, and had apparently been left to become self-sown turf. The plants which had colonized it were: *Bellis* (20), the most abundant plant, *Ranunculus repens* (10) and *Holcus lanatus* (10) came next, the rest (60) was a very scattered mixture of the following:—*Leontodon pratensis*, *Rhinanthus Crista-galli*, *Plantago lanceolata*, *Myosotis versicolor*, *Trifolium repens*, *Prunella vulgaris*, *Rumex Acetosa*, *R. crispa*, *R. obtusifolius*, *Euphrasia Rostkoviana*, *Achillæa Ptarmica*, *Lychnis Flos-cuculi* (in a quite dry place), *Viola tricolor*, *Poa annua*, *P. pratensis*, *Lolium perenne*, and *Lotus corniculatus*.

In a slightly peaty marsh near Ollaberry, I spent a considerable time in trying to make out any dominant or subdominant plant. I found the attempt quite useless, as I have often found it before in many other situations besides marshes; it is quite impossible to find dominance or subdominance in every association of plants one may meet with. This very mixed association consisted of the following, hardly one plant being appreciably more abundant than another:—*Lychnis Flos-cuculi*, *Ranunculus Flammula*, *R. acris*, *Eriophorum polystachion*, *Euphrasia* (all in seed), *Carex echinata*, *C. Goodenowii* (with dark spikes), *Pedicularis palustris*, *Holcus lanatus*, *Equisetum palustre*, *Trifolium repens*, *Anthoxanthum odoratum*, *Juncus supinus*, *J. acutiflorus* (in some places and generally dwarfed), *Luzula multiflora*, with but small quantities of *Triglochin palustre*, *Orchis maculata*, *O. latifolia*, and less still of *Spiræa Ulmaria*, *Menyanthes*, and *Senecio aquaticus*. In a few of the wettest places *Philonotis fontana* was certainly dominant in very small areas, associated at the margins of the patches with *Hypnum cuspidatum*, *Pellia epiphylla*, and *Mnium rostratum*. On the drier banks of this marsh *Scabiosa succisa* was frequent. About a hundred or more yards away the marsh was a little more sloping; neither dominance nor subdominance of any species was shown, but a few more species began to appear among those above mentioned, such as *Carex flava*, *C. Hornschuchiana*, *C. panicea*, *C. dioica*, *C. flacca*, *C. pulicaria*, *Pinguicula vulgaris*, a greater proportion of *Senecio aquaticus*, and much more *Hypnum cuspidatum*, with *H. falcatum*. In the drier parts *Molinia*, *Plantago maritima*, *Leontodon pratensis*, and *Scabiosa succisa* replaced some of the other species. Where there was a bank, *Galium verum*, *Bellis*, *Lotus corniculatus*, and *Cynosurus cristatus* appeared, and where it was somewhat stagnant *Potamogeton polygonifolius* occurred, whilst outstanding rocks bore a rich covering of *Trentepohlia aurea*.

In some adjoining hay-fields which had been fenced off from this marshy land and drained, the following mixture occurred with nothing dominant, not even one of the grasses :—*Holcus lanatus*, *Scabiosa succisa*, *Trifolium repens*, *Rumex Acetosa*, *Senecio aquaticus*, *Cerastium vulgatum*, *Euphrasia* (in fruit), *Cynosurus cristatus*, *Plantago lanceolata*, *Trifolium pratense*, *Leontodon pratensis*, *Prunella*, *Ranunculus acris*, *Lotus corniculatus*, *Agrostis tenuis*, *Anthoxanthum* (withered), and *Rhinanthus Crista-galli*, the latter being much more abundant in some fields than others.

In some drier pastures to the north-east of Ollaberry (where I had to divide my attention in one place between a giant bull and the flora) there was nothing dominant or subdominant; all the herbage was dwarfed and indicated its moorland origin. The following constituted the flora :—*Festuca ovina* (viviparous), *Pedicularis sylvatica*, *Calluna* (very dwarfed), *Scabiosa succisa*, *Juncus acutiflorus*, *Potentilla sylvestris*, *Prunella*, *Euphrasia*, *Plantago lanceolata*, *Sieglingia*, *Luzula campestris*, *Ranunculus Flammula*, *Equisetum palustre*, *Carex flava*, *C. flacca*, *C. panicea*, and in some hollows *Calthia*. In less quantity occurred *Bellis*, *Agrostis tenuis*, *Leontodon pratensis*, *Nardus*, *Plantago maritima*, *Holcus lanatus*, *Aira flexuosa*, and *Juncus squarrosus*. On diminutive hillocks were also *Thalictrum alpinum*, *Ranunculus acris* (dwarfed), *Rumex Acetosa*, *Poa annua*, more *Bellis*, *Thymus Serpyllum*, and *Viola canina*. On the rocks the chief plants were *Physcia tenella*, *Platysma glaucum*, and *Homalothecium sericeum*. Scattered all over the pasture among the rest were patches of *Sphagnum acutifolium* (in fair quantity), *Hylocomium loreum*, *Hypnum squarrosum*, *Dicranum scoparium*, and *Cladina sylvatica*.

On some subvertical rocks facing the sea there was an abundance of *Lecanora subfusca* var. *campestris*, associated with *Rhizocarpa petræum*, *Verrucaria muralis*, *Opegrapha confluens*, *Buellia myriocarpa*, and *Lecanora irrubata*, whilst on some neighbouring rocks were *Cladonia verticillata*, *Lecanora ferruginea*, *L. atra*, and *Lecidea latypes*. *Physcia speciosa* was growing upon old *Ulota phyllantha*.

The moorland above was peaty; *Calluna* was usually dominant, mixed with varying proportions of *Eriophorum polystachion*, though I saw no place that could be termed a "Cotton-grass Moor," unless a few square yards now and then could be construed into such. There was a scattered flora amongst it, such plants as *Nardus*, *Potentilla sylvestris*, *Agrostis canina*, *Carex flava*, and *Empetrum*, the species and their relative proportion altering as the land got more stony or otherwise, and where the schistose rocks stood out, especially where they were much exposed, they were almost covered with *Leconora parella* var. *gyrocheila* (25), *Cladonia cervicornis* (20), *Stereocaulon coralloides* (15), *Sphærophoron coralloides* (8), *Andreæa petrophila* (7), *Cetraria aculeata* (5), and about 20 per cent. of bareness. Here and there were patches of *Parmelia omphalodes*, *Rhizocarpon geographicum*, *Lecidea contigua*, and *L. rivulosa*. The associations in the rock-crevices consisted of tufts of *Polytrichum piliferum*, *Empetrum*, *Nardus*, *Carex flava*, and sometimes *Potentilla sylvestris*.

The moorland towards the Whaling Station at Ronas Voe had

Calluna as the dominant plant, especially in sheltered places; no species could be called subdominant, the intermingled plants varied much as regards their relative numbers in different places. *Nardus* was the most frequent grass, but it was not in tussocks; other constituents were *Anthoxanthum*, *Scirpus cæspitosus*, *Luzula congesta*, *Juncus squarrosus*, *Empetrum*, *Potentilla sylvestris*, *Carex panicea*, *Agrostis tenuis*, *A. canina*, *Festuca ovina* (viviparous), *Scabiosa succisa*, *Aira flexuosa*, *Molinia*, *Narthecium*, with here and there *Rhinanthus*, *Euphrasia*, and *Galium saxatile*. Scattered amongst these plants all over the undulating moorland were masses of *Sphagnum acutifolium*, *S. subsecundum*, *S. cymbifolium*, *S. rigidum*, with greater or less patches of *Polytrichum commune*, *P. juniperinum*, *P. urnigerum*, *P. piliferum*, *Campylopus atrovirens*, *C. brevipilus*, *C. turfaceus*, *Hypnum Schreberi*, *H. cupressiforme*, *Hylocomium loreum*, *H. splendens*, *Dicanum scoparium*, *Aulacomnium palustre*, *Nardia scalaris*, *Cladonia cervicornis*, *C. uncialis*, *C. pungens*, *C. coccifera*, *C. furcata*, and *Cetraria islandica*; whilst small stones were often covered with forms of *Lecidea contigua*.

Little mats of *Ephebeia hispidula* occurred on some of the rocks. An association of plants which covered a large granite rock in a small loch near Loch Eela consisted of a mass of seven or eight square feet of *Rhacomitrium lanuginosum*, nearly two-fifths of which was mostly covered with *Empetrum nigrum*, and alongside it were large patches of *Antitrichia curtipendula*; the rest of the rock was covered with a mixture of *Parmelia fuliginosa*, *P. saxatilis*, *P. omphalodes*, *Lecidea geographica*, *L. contigua*, *L. rivulosa*, *Pertusaria dealbata*, *Rhacomitrium aciculare*, *R. heterostichum*, and an *Orthotrichum* (not yet examined). On another granite rock not far away there was an abundance of *Rhizocarpon confervoides*; whilst another mass of pure quartz was completely covered with *Lecidea rivulosa*.

Ronas Hill, which attains an elevation of 1475 ft., latitude above 60° 30′ (further north than Bergen in Norway), was visited; unfortunately a drizzling mist supervened which somewhat hindered the investigation. I found it to be very barren; it consists of a great mass of red granite, which weathers very rapidly, and hence is poor in vascular rock-plants, petrophilous lichens, mosses, and such Hepaticæ as *Gymnomitria*. The soil formed by the weathered material also seems very unstable. Outstanding rocks were few and had to be looked for. The flattish and somewhat bare summit yielded (all the plants being very dwarfed):—*Salix herbacea*, *Antennaria dioica*, *Thymus Serpyllum*, *Plantago maritima* (a variety which some would make into another species; I thought it might belong to var. *lanata*, no plant being more than 1 in. high), *Festuca ovina* (viviparous), *Leontodon pratensis*, *Viola canina*, *Agrostis tenuis*, *Aira flexuosa* (large-flowered variety), *Alchemilla alpina*, and very little *Juncus trifidus* and *Luzula spicata*. Other plants in fair quantity were *Rhacomitrium lanuginosum*, *Oligotrichum hercynicum*, *Andreæa petrophila*, *Lecidea contigua*, and *Thamnolia vermicularis*; the latter was not in distinct patches as I have seen it on the Dovrafjeld, but was nestling in a very scattered manner among *Rhacomitriun lanuginosum.*

On the slope immediately below the summit for some distance towards Ronas Voe the ground was very bare, about six square yards of bareness to every square yard of vegetation, the ground being regularly terraced in some places. The plant covering the granite *débris* was chiefly *Rhacomitrium lanuginosum*, but scattered about it was *Festuca ovina* (viviparous), very dwarfed *Plantago maritima*, *Thymus Serpyllum*, tiny *Calluna*, and occasionally *Agrostis tenuis* or *Empetrum.*

On that side of the ascent from Colla Firth there was one somewhat flattish place of some extent paved with rough granite *débris*. On this *Arctostaphylos Uva-ursi* was quite as dominant as *Calluna*, in some places more so. Here *Rhacomitrium lanuginosum* was undoubtedly the dominant plant (40), *Arctostaphylos Uva-ursi* (20+), *Calluna* (20−), *Erica cinerea* (10); the remaining plants (10) were, along with a certain amount of bareness, *Nardus*, *Molinia* (barren), *Scirpus cæspitosus*, *Potentilla sylvestris*, and *Festuca ovina* (viviparous). Here and there among the *Rhacomitrium* were patches of *Cladina sylvatica.*

Another part of the slope at some distance was examined on the same kind of soil; the dominant plants were about equal quantities of *Calluna* and *Rhacomitrium lanuginosum*; the rest of the plants were very scattered, though at times quite equal and often exceeding—collectively—the two plants already mentioned; they consisted of a mixture of *Nardus*, *Sieglingia*, *Scirpus cæspitosus*, *Potentilla sylvestris*, and *Agrostis tenuis*. *Narthecium*, *Molinia*, and *Erica cinerea* only occurred here and there, with a little *E. Tetralix* in the slight hollows. *Festuca* appeared to be absent, *Carex flacca*, *C. echinata* (attacked by *Ustilago Caricis*), and one or two other over-ripe species were scattered about. On this part of the hill were some hard granite boulders, on which were *Andreæa rupestris*, *Hedwigia ciliata*, *Parmelia lanata*, *P. triste*, *P. saxatilis*, *P. omphalodes*, *P. fuliginosa*, *Gyrophora torrefacta* in abundance, with much less *G. flocculosa* and *G. cylindrica. Parmelia saxatilis* and *P. omphalodes* were often creeping over masses of old *Rhacomitrium lanuginosum*, which covered small rocks. *Lecanora tartarea* was rare on these granite rocks. *Rhizocarpon polycarpum* was more frequent, growing intermingled with *R. geographicum*; the latter was also often mixed with *Lecidea rivulosa.* This latter sometimes was the only plant which covered the rocks. One large boulder of granite was almost covered with an association of *Lecidea polycarpa*, *L. lactea*, and *Lecanora albella.*

The rocks near the shore in both Unst and the Mainland subject to the action of the tides and the spray of storms were examined in several places. The lichens noted were those one usually finds in such situations, with the exception of *Lichnia pygmæa*, which was not seen; it is usually at a lower zone than *L. confinis*, which occurred but sparingly. *Verrucaria maura* was everywhere, sometimes associated with *Lecanora decipiens*, sometimes with *L. sympagea*. Occasionally very narrow and very deep orange forms of *Physcia parietina* occur a foot and a half *below* the zone of *Lichina confinis*. On the rocks a little higher up were *Ramalina scopulorum*, its var. *incrassata*, and *R. cuspidata*; while still higher were extensive sheets of *Lecanora parella*, with angular apothecia on account of their crowdedness; *L. atra* was less abundant than usual, and *L. ferruginea* f. *æstiva* occurred in a scattered manner.

On some of the moorlands near Lerwick *Calluna* was both larger and more abundant than in Unst and about Ollaberry; *Anthoxanthum* and *Aira flexuosa* were also in greater quantity. There seemed to be much less *Sphagnum* and *Scabiosa succisa*. *Rhacomitrium lanuginosum* was not a great feature, except in places which receive a driving wind at two hundred or more feet elevation.

The schistose rocks that were much exposed had on them plenty of *Lecanora parella* var. *gyrocheila*, *Lecidea rivulosa*, *L. contigua*. The rocks lower down, about which gulls congregate, have usually a different flora; some had abundance of the nitrophilous *Physcia lychnea*, whilst others were covered with a small species of that still more nitrophilous genus *Prasiola*.

(To be continued.)

NEW AND RARE WEST AUSTRALIAN PLANTS.—II.[*]

By Alexander Morrison, M.D.

Solanum tetrandrum R. Br. var. angustifolium var. nov. A typo discrepans præsertim ob folia anguste oblongo-lanceolata.

A slender soft-wooded shrub of 3 or 4 ft., without prickles, but covered with a dense tomentum of stellate scales, and answering generally to the description of *S. tetrandrum* R. Br. The leaves, however, are not ovate, but narrow oblong-lanceolate, closely induplicate and recurved at the top, without lobes, and measuring 6–8 cm. × 0·4–0·7 cm. Both calyx and corolla are cleft very irregularly, but the corolla less deeply, so that the lobes are shorter and broader than described. The stamens, so far from being only four in number, are sometimes six.

Ashburton River, October.

Duboisia Campbelli A. Morrison in Journ. W. A. Nat. Hist. Soc. ii. (3), 15 (1906). Foliis anguste oblongo-lanceolatis utrinque coarctatis apice acuminatis dimidio superiore distanter denticulatis, floribus in axillis superioribus 3–6-nis pedicellatis, calycis parvi lobis lanceolatis tubum æquantibus, corollæ intus lanatæ

[* See pp. 164–168. *Calandrinia Creethæ* (p. 165) is there first published; it should be cited as of Morrison, as only the name was suggested by Dr. Tratman. *Indigofera boviperda* (p. 166) was mentioned but not described in a report by E. A. Mann, Government Analyst, on the chemical composition of the plant, in the *Journal of Agriculture of W. Australia*, xiii. 28 (1908).—Ed. Journ. Bot.]

lobis oblongo-ovatis obtusissimis, staminibus exsertis, ovario glabro in stylum glabrum incurvum gradatim exeunte.

Leaves alternate, sessile or shortly petiolate, narrow oblong-lanceolate, tapering at both ends, distantly toothed on margin in upper half, ending in a short acutely acuminate more or less curved almost pungent point, reticulate or wrinkled with midrib and two parallel veins more prominent, reaching 67 mm. in length, and 6 mm. in breadth. Flowers in axillary clusters of three to five or six in axils of leaves at ends of branches, no bracts, pedicels flattened below, angular, gradually thickening upwards to calyx, about 4 mm. long; calyx small, with five lanceolate acute lobes about as long as the tube, the prominent ribs continued down pedicel; corolla campanulate, with prominent ridges at junction of segments, about 5 mm. long, lobes 2 mm., equal, spreading, oblong-ovate, very obtuse, with woolly pubescence on inner surface extending down tube; stamens 4, exserted beyond tube, anthers reniform, the cells confluent at apex; ovary 2-celled, glabrous, after fall of corolla projecting 1 mm. beyond calyx-lobes, tapering to style, which is glabrous and curved, with a small stigma.

Hannan's Lake, Boulder, November; also Norseman, Dundas Goldfield, October; *W. D. Campbell.*

A much-branched glabrous shrub, with the young parts viscid. Although the mature fruit has not been seen, the general aspect of the plant points to *Duboisia*, in which the fruit is a berry, while in the nearly allied genus *Anthocercis* it is capsular. The form of the inflorescence, however, is different from that of allied species, the flowers being all in fascicles in the axils of well-developed leaves, packed with their flattened pedicels in one plane between stem and leaf, and opening centrifugally. The leaves also, though similar to those of *D. Hopwoodi*, are distinctive in being toothed in the upper half, and not always distinctly petiolate.

The specimen from Norseman, with its white flowers and the natural green of its leaves better preserved, shows some divergence from the form particularly described above. The flowers are not quite so numerous in the fascicle, but they are of twice the size, the pedicels being 10–12 mm., calyx 3 mm., and corolla 10 mm. in length. The leaves, however, show the same characteristic teeth and apex, though they are somewhat shorter and thicker. On the branches are to be seen four ridges or interrupted lines of resin globules, running downwards from each petiole for one or two internodes. A similar variability in the size of the flowers appears to exist in specimens, from different districts, of *D. Hopwoodi*, to which this species shows most affinity; but the degree of development as regards size is probably dependent more on the amount of rainfall in the preceding season than on any other condition existing in the locality itself.

Grevillea Victori, n. sp. Frutex elatus foliis angustissime linearibus acutis complanatis sericeo-tomentosis, floribus in racemis paniculatis dispositis, perianthio angusto, toro obliquo, glandula hippocrepiformi, stigmatis disco obliquo, ovario stipitato villoso, folliculo glabro.

Leaves very narrow linear, flattened, silky tomentose, slightly contracted and rounded at base but broader over insertion, acutely pointed and almost pungent, striate with three veins on upper surface besides the nerve-like margins, on under side midrib very broad and crowding out the lateral veins, maximum length 9 cm., breadth about 1 mm.

Racemes cylindrical, pedunculate in axils of uppermost leaves, forming a leafy panicle, maximum length 6 cm., breadth 2·5 cm.; peduncles rusty tomentose, from 1 cm. to about 4 cm. long, rhachis densely and softly villous. Pedicels slender, villous, 4–6 mm. long, perianth-tube narrow throughout, much revolute under the limb, villous externally, glabrous inside, 7 mm. in length, the upper segments much shorter than the lower, limb globular, about 1·5 mm. diam., densely covered with long silky hairs. Torus oblique, large, gland horseshoe-shaped, ovary on a short tomentose stipes close to upper edge of torus, hidden under a dense silky pubescence. Pistil 12 mm. long, style about 9 mm., loosely villous chiefly on back, stigmatic disc oval, very oblique, or lateral with an undulating free margin all round, and convex in centre. Fruit globose, oblique, on pedicels of 5 mm., surface even, hoary villous, becoming blackish with age, about 2 cm. diam.; valves with hard and crustaceous walls 1 mm. or rather more in thickness, opening freely along upper suture and splitting readily on shorter lower side. Seeds orbicular plano-convex chocolate-brown discs, 4 mm. thick and about 1·5 cm. diam., including a wing about 2 mm. broad all round margin.

Kununoppin, 130 miles east by north from Perth, October; *F. E. Victor.*

A hoary free-flowering shrub of 6–8 ft., branching from 12-18 in. above ground.

If the position of this plant in the genus *Grevillea* were to be decided by its possession of some of the less common characteristics of the flowers, its villous style and stipitate as well as villous ovary, with lateral stigmatic disc, would bring it into sect. 7, *Eriostylis*, of which these are the most striking features. Its panicled racemes with acicular leaves suggest sections *Cycladenia* and *Cycloptera*, or *G. polybotrya* and *nematophylla* in *Conogyne*; but it has little in common with these in the details of structure of the flowers. It has the villous ovary and lateral disc of *Ptychocarpa* and *Plagiopoda*, and also an oblique torus as in the latter; yet its nearest affinity is probably to sect. 4, *Calothyrsus*, in which a number of forms are grouped, showing an oblique torus, stipitate ovary, and oblique stigmatic disc, many having also a panicle of cylindrical racemes.

Grevillea simulans, n. sp. Arbuscula foliis brevipetiolatis integris anguste linearibus vel filiformibus apice breviter acuminatis acumine uncinato, racemis elongatis cylindricis paniculam terminalem formantibus, perianthio infra limbum depresse globosum recurvo, toro recto, glandula incompleta, ovario breviter stipitato, stylo glabro, stigmatis disco obliquo, folliculo ellipsoideo glabro.

A small tree, about 16 ft. high, growing on sandhills, with ashy-grey green foliage, and a dense and close silky pubescence slowly wearing off the branches.

The leaves are all undivided, narrow linear or filiform, shortly petiolate, reaching 18 cm. in length and 1–1·5 mm. in breadth, flattened, grooved underneath on either side of the thick midrib, the tips shortly acuminate and uncinate.

Racemes elongated cylindrical, sometimes secund, as many as ten or twelve forming a panicle immediately above the uppermost leaves, but usually exceeded by them, maximum length 10 cm. × 1·5 cm. broad, the whole inflorescence densely tomentose with appressed silky hairs. Flowers dense, on pedicels of 1·5–3 mm., perianth recurved below the depressed-globular limb, bearded inside opposite the stipe of the ovary. Torus straight, the gland forming an incomplete ring, ovary glabrous, subglobose, on a stipe of about 1 mm. long springing from the centre of the torus, style glabrous, 6–7 mm. long, stigmatic disc oblique, orbicular, with a thin undulating free margin and raised towards centre. Fruit (immature) ellipsoidal, glabrous, smooth, dark brown, very oblique, having the longer diameter almost transverse to the direction of the stalk and style, the largest 11 × 8 mm., seed winged all round.

Uaroo and Minderoo, Ashburton River.

This species closely resembles *G. nematophylla* F. v. M. in aspect, but differs in its leaves with recurved margins, and in its lateral stigmatic disc, which is associated with a depressed-globular not ovoid perianth limb in the bud. The gland sometimes forms an almost complete ring, indicating an approach to the species in sect. *Cycladenia*, in which an annular gland and a lateral stigma are found. The value, as a distinguishing character, of the perfectly annular form of the hypogynous gland is probably less than the position of the stipe of the ovary in the centre of the torus, instead of being seated on or close to the margin, so that, as in the majority of the species of *Grevillea*, there is room for the gland on one side only. In the case of *G. eryngioides*, in which the gland is described as semicircular, I have found it to form sometimes a complete ring; but as the ring is, presumably, as a general rule imperfect, the species has been placed in sect. *Occidentales*, with the generality of which it does not seem to have much in common. Diels has described the same irregularity in the formation of the hypogynous gland in his *G. Pardieana*, but in the species named, together with *G. Leucadendron*, *G. Hilliana*, and others of sect. *Cycloptera*, there is a general similarity, although the combinations of the different characters are varied in each species. The recently published *G. Berryana* Ewart & White,* from the North Coolgardie District, shows a general agreement in its floral characters with this intra-tropical species, but its leaves besides being compound have very obtuse pinnæ, the stalk of the ovary is long, and the fruit is almost spherical as well as of smaller size.

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* Proc. Roy. Soc. Vict. xxii. (1909), p. 14, pl. 8.

Dryandra teretifolia, n. sp. Frutex nanus caule ascendente lanato-tomentoso, foliis congestis bi- tripinnatis segmentis linearibus teretibus supra canaliculatis, involucri bracteis ovatis subito acuminatis dorso lanato-tomentosis margine dense ciliatis, perianthii hirsuto-villosi lobis abbreviatis apice recurvis, stylo sursum fusiformi pilis recurvis prædito apice breviter dilatato ipso truncato.

Stems 1–2 in. long, ascending, woolly tomentose, at first concealed by lanceolate imbricate scales. Leaves collected under the flower-heads, twice or thrice divided, the longest about a foot in length, including a petiole of 4–5 in.; rhachis and segments slender, rigid, linear-terete, and grooved on the upper side, the primary pinnæ regular in pairs at wide intervals, the secondary segments sometimes opposite but mostly rising singly from the recurved rhachis, and simple or the lower again divided, the segments varying from 7 to 30 mm. in length and ending in short almost pungent points.

Flower-heads closely surrounded by long floral leaves having dilated bases, and passing into the involucral bracts. Involucre semi-ovoid, 4·4 cm. long and 3·2 cm. broad at top, bracts brown, broad, ovate, shortly contracted into acuminate glabrous points, woolly-tomentose on the back with densely ciliate margins, the outermost terminating in reduced leaves, the inner larger, their fine glabrous tips shortly exceeding the unopened flowers, the innermost shorter, their lower third ovate with dense silky villous tufts at the base, the upper two-thirds linear and ciliate with long silky hairs towards the end, the slender acuminate tips glabrous. Perianth over 2·5 cm. long, pale yellowish and villous, the tube slender and tapering at the base, the limb narrow oblong or ovate, 3 mm. in length, the densely villous lobes with terete, glabrous, horn-like, recurved points, 1–1·5 mm. long; style with a fusiform grooved stigmatic end, bearing reflexed hairs along the ridges, the apex shortly dilated and truncate.

Kellerberrin, September; *R. B. Leake.*

This handsome dwarf shrub appears most closely allied to species of the series *Niveæ*, though its repeatedly divided leaves recall those of *D. bipinnatifida.* The short stems, with the leaves crowded under the ovoid flower-heads, and the structure of the flowers, supply characters similar to those of *D. arctotidis* and *D. Preissii*, but the species is distinguished specially by a feature apparently unknown in any other *Dryandra*, namely, the terete form of the leaves, which at the same time are grooved on the upper, not the under, side. The recurving of the rhachis and its pinnæ reminds us of what is to be seen in various species of *Petrophila.*

NOTES ON RUBI SUBERECTI.*

By E. G. Gilbert, M.D.

Rubus Idæus L. This is so variable in the form of its leaf and the amount and character of its armature that it seems likely that deductions have been drawn from similar differences among other Rubi which those differences did not justify. The striking peculiarities of *R. Idæus* have happily preserved it from this dismemberment. It is admitted to differ from *R. cæsius* more than from any *Rubus*, and yet to cross with it. Why, then, may we not think it *probable* that all the intermediate Rubi cross freely? Perhaps because *Idæus* and the *Cæsii* flower earlier than nearly all the other Rubi. I have met with only *R. I.* × *cæsius* and *R. I.* × *sublustris* (Lees); the latter so much resembles the var. *obtusifolius* (Willd.) that it seems to me not improbable that they are identical.

Rubus fissus Lindley. I have not found this near Tunbridge Wells, but on the north-east end of Chislehurst Common it is abundant, growing only a foot or two high. A large proportion of its leaves are 7-nate; this I take to be really due to defective formation of the terminal leaflet, as there are many instances of leaves in conditions intermediate between that and the 5-nate leaves, and also many leaflets curiously cut and manifestly imperfectly developed in other ways. At the other end of the Common *R. carpinifolius* was abundant, and where it extended up to the *fissus* were plants combining their features in a very puzzling way. In having *thin* leaves *not conspicuously* hairy beneath this Chislehurst *fissus* is not true to the description in Mr. Rogers's *Handbook.* I have, however, a specimen from Dunkeld which is more so: this is a remarkably strong, sturdy plant, and has *no 7-nate* or cut leaves, affording a remarkable contrast to the Chislehurst plant; otherwise it is much like it, and Mr. Rogers kindly confirmed my determination as "undoubtedly strong *R. fissus.*" I have, however, found close to *R. suberectus* and *corylifolius* plants wonderfully like this, which I could hardly doubt were hybrids of the two. One of these seemed to me indistinguishable from a specimen of M. Sudre's *sulcatiformis*, which he thinks to be *R. suberectus* × *R. cæsius*; and also from some specimens of *suberectus* and *fissus* in the Kew Herbarium. Is not the suggestion that we ought to be careful not to confuse such hybrids with the pure *Suberecti* justified by this? Moreover, Mr. Rogers notes, in his *Handbook*, that *R. fissus* becomes "more like *suberectus* in damp shady places"; I have also seen *R. plicatus* extend down to the damp lower corner of a steep north slope, and there very closely resemble *suberectus* and *fissus.* The only distinctive mark of *R. fissus* which holds good in the specimens of the *Suberecti* in the National Herbaria is the "many slender subulate" prickles.

It is noteworthy that the descriptions of *fissus* and *corylifolius* in Mr. Rogers's *Handbook* resemble each other: another item in the evidence in favour of the supposition that there may be closer relationship between the two than is usually suspected, or that *suberectus* × *corylifolius* has been taken for *fissus*. The terminal leaflet of *R. c.* var. *sublustris* is often divided into two or three.

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* See Journ. Bot. 1907, 209.

RUBUS SUBERECTUS Anderson. I have not met with this plant on the Kentish side of Tunbridge Wells, but have found it scattered thinly about damp woods in East Sussex and North-east Surrey. I believe I have found hybrids of it with *carpinifolius*, *argenteus*, *corylifolius*, and *Balfourianus*, where these have grown close to it. It is variable, and in the National Herbaria much confused with other *Suberecti*; but its sparse small prickles, especially on the panicles which are simple or nearly so, its very green sepals, its suckers, and flowering earlier than the other *Suberecti* are sufficiently distinctive. In the Surrey wood at Lingfield and Dormans *R. sulcatus* grows with it; *R. Rogersii* occurs on the railway bank at the edge of the wood. There is no *plicatus* nor *fissus* near by: I have carefully searched the spot and examined the Rubi there about thirty times in the last nine years. Any one, I think, seeing the plants there would be struck with the obviously close relationship between *Rogersii* and the *suberectus* near by in the same wood.

RUBUS ROGERSII Linton. Within my experience *R. Rogersii* occurs near Tunbridge Wells as a single bush seldom met with—once in a wood in conjunction with *R. suberectus* and *R. sulcatus* in Surrey, and once on our Common, where *plicatus* is abundant. These facts, combined with its own features and with the marked differences there are between the specimens in our National Herbaria, make me suspect that it may be really a hybrid with *R. carpinifolius* near by, or confused with it by some observers. In October, 1907, there were eight specimens in the British Museum: on a critical examination I found they included four quite distinct forms, combining in different ways *plicatus* and *carpinifolius*. On Chislehurst Common, where *carpinifolius* and *fissus* meet, I found, in 1910, plants very closely resembling *Rogersii* (short-stamened *plicatus* is there also, and apparently "intermediate" plants). I have a Scotch specimen of *R. Rogersii*, kindly given me by Mr. Rogers; except in being smaller, this is exactly like another Scotch one I have, which he labelled "undoubtedly strong *fissus*." *R. Rogersii* is held by Dr. Focke to be identical with his *R. ammobius*, which is considered by Nyman as a hybrid of *plicatus*. Again, it has been often confused with Dr. Focke's *opacus*, but *opacus* is itself thought to be a hybrid of *plicatus*. Quite close to *Rogersii* I have found what appeared to me probably a hybrid of it with *rusticanus*, and another with *corylifolius*. The impression left on my mind is that *R. Rogersii* is a hybrid of *R. carpinifolius* with *suberectus* or *plicatus*, and that forms of *plicatus* are also apt to be confused with it.

RUBUS SULCATUS Vest. I have had particularly favourable opportunities of studying the differences between *R. sulcatus* and *R. suberectus* through finding them growing very near together by the same pathway in a wood at Lingfield. The following notes were made on the spot on July 7th, 1910:—

R. sulcatus. Stem *little grooved*, not at all sometimes; leaves *chiefly* 5-nate below and at the base of the shoots; first year's shoots sulcate near distal end, *if not flowering; suckers* present as in *suberectus*.

R. suberectus. Stem slightly grooved; leaves ternate at base of both stem and shoots, paler above than in *sulcatus*, often cordate, and the toothing simpler and larger; flowering over. With *sulcatus* flowering not yet declining.

I made these notes very carefully, because on critically looking through the specimens in the British Museum, at Kew, and in Mr. Rogers's herbarium, I found it impossible to discriminate *R. sulcatus* from *suberectus*, or from *Bertramii*. I think I can at last distinguish between these three, although I by no means wish to assert what is the relation between them, and must admit that Mr. Rogers thinks that my *sulcatus* is *Bertramii*. But it is a distinctly different plant from one abundant close to Tunbridge Wells, which, guided by Dr. Focke in Ascherson and Graebner's *Synopsis*, I have taken to be *R. Bertramii*, and with which other forms of *R. plicatus* are also abundant; whereas at Lingfield I have never seen any suberectan but *suberectus*, a little *Rogersii*, and *sulcatus*. *R. sulcatus* seems to me to bear a relation to *suberectus* similar to that of *Bertramii* to *plicatus*. Grooving of the stem is, I think, often dependent on luxuriance in other Rubi as well as *sulcatus*. Other stems, too, are apt to become grooved when dried, if they were at all immature.

Rubus plicatus W. & N. This is abundant at and near Tunbridge Wells—typical *plicatus*, a short-stamened, small form probably identical with Dr. Focke's var. *pseudo-hemistemon*, an occasional plant of Mr. Rogers's *hemistemon*, and, most abundantly, a plant I take to be Dr. Focke's var. *Bertramii*. The last-named Mr. Rogers, who saw it growing in 1902, suggested was *R. nitidus*, but he has latterly considered it a form of *R. lentiginosus* Lees—a determination I find myself unable to confirm. It very closely resembles a specimen of *R. ammobius* I have seen, but at last, guided by Dr. Focke's *Synopsis* in Ascherson and Graebner's *Flora*, and by a specimen from G. Braun himself, I have concluded that it must be his *Bertramii*. It varies much, and there are "intermediates" between it and typical *plicatus* and other varieties, from which, however, it differs much. It also flowers nearly a fortnight later. *Pseudo-hemistemon* is the earliest form to flower; it does so during the second week in June in South-east England, yet, if the summer is wet and cool, does not ripen nearly all its fruit. This variety is confused in the National Herbaria with *fissus* and *suberectus*, but it does not resemble them very closely. Mr. Rogers, in 1902, had difficulty in distinguishing it from *R. Rogersii*. *R. plicatus* differs from *suberectus* and *sulcatus* in having no suckers, and in rooting at the tips of its first year's stems. Its hybrids seem to me to be numerous, especially with the *Corylifolii.*

I meet with a plant here and there of the var. *hemistemon* of Mr. Rogers's *Handbook* which is greyer, more hairy, has entire-based leaflets and no stalked glands, and also, but rarely, with isolated specimens, as I believe, of the *hemistemon* of Dr. Focke and Müller, which seems, like *R. orthoclados* Ley, to be intermediate between *R. plicatus* and *Sprengelii.* The luxuriant var. *Bertramii* has, I believe, been much confused with *R. sulcatus* Vest. I have found here plants probably hybrids of *plicatus* with *pulcherrimus* and *corylifolius*, and with *Questierii.* The var. *Bertramii* comes into flower about ten days after *pseudo-hemistemon.* It is a larger, less typically suberect plant, and has strikingly beautiful, sharp, irregular, double serratures to its leaves.

NEW AND RARE BRITISH PLANT-GALLS.

By E. W. Swanton.

During a recent stay in Devonshire I found two galls that are, I think, new records for the British Isles.

In the Newton Abbot district *Geranium lucidum* is extensively galled by mites. The galls are very distinctive. The leaves are tufted, swollen, and deformed, with the margins rolled inwards; the interior of the roll, and very frequently the outer surface, is covered with a felt of yellowish green (occasionally reddish) hairs. The mite that is usually associated with these alterations is *Eriophyes geranii* Canestrini, but *Eriophyes dolichosoma* Canestrini has also been found thereon. I failed to find this gall on other species of Geranium. On the Continent *Eriophyes geranii* commonly infests *G. sanguineum*; the galls have been recorded from Denmark, France, Italy, and Central Europe. They have been noted on *G. molle* in Central Europe and France, on *G. dissectum* in Denmark, and on *G. lucidum* in Italy. There is no record of mite-galls occurring on *G. Robertianum*; that plant is everywhere shunned by mites, at least by gall-causing species. In many spots near Newton Abbot I found *G. lucidum* and *G. Robertianum* growing side by side with intermingled stems, but in no instance was the latter species galled, though the leaves of the former were badly attacked. The strong-smelling *G. Robertianum* evidently contains something that is exceedingly obnoxious to mites, and which serves to protect it against their attacks.

At Slapton Sands, also at Petit Tor, Torquay, I found the Madder (*Rubia peregrina*) bearing galls resulting from the presence of the mites *Eriophyes rubiæ* Canestrini. Viewed superficially, an infected plant appears to have swollen flowers, but upon closer inspection it is evident that the hypertrophied parts consist of the undeveloped apical whorls of leaves. The gall is greenish at first. It is usually globular (8 × 4 mm.) and becomes black when dry. It has been recorded from France, Portugal, Italy, and Algeria.

For what appears to be another new record I am indebted to my friend Mr. Samuel Mason, who found leaves of *Euonymus europæus* in the neighbourhood of Newton Abbot with margins more or less rolled upwards and discoloured (sometimes with a purplish tint), the rolled part covered with a felt of minute hairs. This gall results from the presence of the mite *Eriophyes convolvens* Nalepa. It has been recorded from many places in Northern and Central Europe, also France and Italy.

I have also to note the occurrence of galls caused by the mite *Eriophyes padi* Nalepa on leaves of *Prunus spinosa*. This gall differs from the very familiar one caused by *E. similis* Nalepa in its greater pubescence, its position (usually on the midrib, not on the margin), and in the absence of marked swelling around the aperture which is more hairy than that of *E. similis*. I observed this gall in hedges in the Stours district, near Shaftesbury, Dorset.

The galls mentioned above were found after the final proof-sheets of my *British Plant-Galls* had gone to press, consequently are new additions to the classified catalogue of galls given therein.

The well-known cuckoo-spit insect or froghopper (*Philænus spumarius*) is not classed as a gall-causer, but as it causes alteration in form of certain plants which it affects, it appears to merit that distinction. One of its favourite plants is *Œnanthe crocata*, on which it usually takes up its position at the apex of the peduncle immediately below the pedicels. There it drives in its proboscis, sucks up the sap, and blows the familiar frothy patches which are necessary for its well-being, serving to protect it from heat, and to keep the body moist. The pedicels adjacent to the seat of its operations do not lengthen, and are slightly thicker than normal ones. Instead of attaining two inches they seldom exceed half an inch in length, hence the flower-heads are closely adjacent and form a globose mass. The stem of *Linaria vulgaris* becomes proliferous when attacked by the froghopper, producing a tuft of short branches above the point of attack.

It may be of interest to note that the remarkable and rare galls on *Œnanthe crocata*, caused by the fungus *Protomyces macrosporus* Unger, were very conspicuous in June on the banks of the canal at Newton Abbot. The equally rare galls on *Convolvulus arvensis* caused by the mite *Eriophyes convolvuli* Nalepa, were abundant on Berry Head, Brixham, on the slopes beyond the second fort at the spot where I first observed them three years ago.

BIBLIOGRAPHICAL NOTES.

LI.—The Dates of Hooker's 'Flora Antarctica.'

When I published the dates of the constituent parts of Sir Joseph Hooker's *Flora Novæ Zealandiæ* and *Flora Tasmaniæ* in Bull. Herb. Boiss. i. (1893) p. 299, and Journ. Bot. xlvii. (1909) pp. 106–107, I was unable to do as much for the earlier *Flora Antarctica*, for no dates were noted in the copy of that work in the library of the Herbarium in the Royal Botanic Gardens, Kew.

Last autumn, however, Dr. B. L. Robinson wrote to me, asking whether it were possible to get to the actual dates of the various parts as issued of the *Flora Antarctica*. On receiving this letter, it occurred to me that possibly in the records of the Linnean Society might be discovered the dates when the respective parts came out, and upon referring to the Donation Book I have been able to draw up the table appended, in some measure relying also on the preliminary announcements in Hooker's Lond. Journ. Bot. iii. (1844) pp. 274–276; *ibid.* iv. (1845) pp. 30–33. Doubts as to the precise limits of a few parts are shown by the sign (?).

At Dr. Robinson's suggestion I am putting these dates upon record for the information of others; the dates specified are those when each part was received by the Linnean Society, which may be slightly later by a few days than the actual date of issue.

VOL. I. "MAY 1, 1845, KEW."

Part.	Date.		Pages.	Plates.
1	3 June,	1844	1– 24	1– 8
2	4 July,	,,	25– 48	9–16
3	16 Aug.	,,	49– 72	17–24
4	14 Oct.	,,	73– 96	25–32
5	,,	,,	97–120	33–40
6	2 Dec.	,,	121–144	41–48
7	21 Jan.	1845	145–168	49–56
8	25 Mar.	,,	169–184?	57–64
9	,,	,,	185?–200?	65–72
10	[1 May]	,,	201?–208	73–80

VOL. II. "6 SEPT. 1847, KEW."

Part.	Date.		Pages.	Plates.
11	7 Oct.	1845	209–232	81– 88
12	3 Nov.	,,	233–256	89– 96
13	4 Dec.	,,	257–280	97–104
14	2 Feb.	1846	281–304	105–112
15	2 Mar.	,,	305–324	113–120
16	4 April,	,,	325–348	121–128
17	5 May,	,,	349–372	129–136
18	1 June,	,,	373–396	137–144
19	1 Aug.	,,	397–420	145–152
20	3 Nov.	,,	421–444	153–160
21	5 Dec.	,,	445–468	161–168
22	1 Jan.	1847	469–492	169–176
23	2 Feb.	,,	493–516	177–184
24	3 May,	,,	517–540	185–192
25	2 Oct.	,,	541–574 (and 3 leaves)	193–198

B. DAYDON JACKSON.

"NEW WEST AUSTRALIAN PLANTS."

We note with regret that the publication of several of the plants described by Mr. W. V. Fitzgerald on pp. 18–23 has been anticipated by Dr. Ewart and Dr. Jean White in their "Contributions to the Flora of Australia," published in the *Proceedings of the Royal Society of Victoria.* It is right to say that the author is not to blame for this, at any rate in the majority of cases, as his paper had been in our possession some time before its publication, and the species were doubtless undescribed at the time the paper was written. We note that Drs. Ewart and White, while citing Mr. Fitzgerald as the author of the names, also attach their own. There is of course no obligation to cite a MS. name, but when it is quoted, the custom, dictated by courtesy, is to attribute it to its author, leaving those who subsequently refer to the new species to add to it that of its publisher, as prescribed in Art. 42 of the Vienna Rules. We would point out, however, that Art. 40 of the Rules lays down that after Jan. 1, 1908, only names accompanied by a Latin diagnosis can be regarded as validly published. The descriptions, not only of the plants in question but of the numerous others published by the writers referred to, have no such diagnosis, but are written entirely in English; so that those who follow the Article will be compelled to accept Mr. Fitzgerald's descriptions, which comply with the Vienna ruling.

It may be well to give a list of the names, so far as we have observed them, which have been published in the two places mentioned:—

Acacia Ewartiana W. V. Fitzg. in Journ. Bot. 1912, 19; Ewart & White in Proc. R. Soc. Vict. xxiii. 287, t. 49 (1911).
A. eremophila W. V. Fitzg. *l. c.* = *A. leptoneura* var. *eremophila* Ewart & White, *op. cit.* 286, t. 50.
A. Kochii W. V. Fitzg. *op. cit.* 20; Ewart & White, *op. cit.* 285, t. 49.
Drosera Andersoniana W. V. Fitzg. *op. cit.* 21; Ewart & White, *op. cit.* xxii. 93, t. 72 (1909).
Angianthus axilliflorus W. V. Fitzg. *l. c.* = *A. axiliflorus* Ewart & White, *op. cit.* 315, t. 56 (1910).
Ptilotus (*Trichinium*) *eriostrichus* (sphalm. *eriostrichus*) W. V. Fitzg. *l. c.* 22 = *Trichinium eriotrichum* Ewart & White, *op. cit.* 325, t. 60 (1910).

It seems desirable to call attention to the (very crude) figures which accompany the descriptions of Drs. Ewart and White, as no reference is made to them in the text; it will be remembered that Art. 37 of the Vienna Rules limits the date at which such plates accompanied by analyses can be considered as equivalent to a description to the period before Jan. 1, 1908.

SHORT NOTES.

Two New British Hepaticæ. — *Lophozia confertifolia* Schiffner. Near summit of Errigal, Co. Donegal, 2400 ft., *J. Hunter*, October, 1911. *L. longiflora* (Nees) Schiffner. Among *Sphagnum*, in a wood near Killin, Perthshire, *J. Hunter*, April, 1911. It is somewhat remarkable that both these species should be mentioned by Mr. Macvicar in his admirable *Student's Handbook of British Hepatics* as being likely to be found with us. Both species have been confirmed by Prof. Schiffner.—W. H. Pearson.

Cochlearia anglica L.—In his review of Mr. White's *Flora of Bristol*, Mr. Marshall (p. 234) mentions the above species, and remarks: "From the description the Bristol form must be the Linnean type, Hort's var. *didyma*." Is this a misprint for "*β gemina* (Hort MS.)" in Babington's *Manual*, ed. 3 (1851) p. 27? [Yes, E. S. M.] With regard to the name, var. *Hortii* Syme, I think this is preoccupied by var. *stenocarpa* ("Die Spielart hat um die Hälfte schmälere Früchte") of Meyer, Chl. Hannoverana, p. 136 (1836). Meyer and Nolte (Nov. Fl. Holsaticæ, p. 57 (1828)) before him both quote for *C. anglica* L. "Eng. Bot. t. 552," but the plate in the 3rd ed., t. 133, is a new one, the old one not being quoted, and no reason given. I notice that in the Cairngorm Club Journal (1895), p. 200, Dr. Trail has "*Cochlearia officinalis* L. *alpina* Grufb." Is there any authority for this? It is not in the *Flora Anglica* (1754), nor in the reprint in the *Amœnitates Academicæ* (1759). If regarded as a variety, it seems (so far as British Floras are concerned) that Babington (Man. Brit. Bot. ed. i. p. 27 (1843) was the first to so name it.—Arthur Bennett.

Utricularia ochroleuca and U. intermedia.—Of the former, which is recorded by Mr. Marshall for Dorset on p. 132, I possess specimens from Westmorland—"Pool on the watershed between Easedale and Langdale, August, 1890: H. E. Fox." I have Irish specimens from "Margin of lake, Ballynahinch, Co. Galway, Aug. 18, 1877: S. A. Stewart"; and "Dochary Bridge, West Donegal, July, 1890: H. N. Dixon." I have *U. intermedia* from the Galway locality given above, where it grows mixed with *U. ochroleuca*; I have no Scottish examples and only one English one collected in E. Norfolk by the Messrs. Groves. Dr. Glück has seen all the specimens mentioned.—Arthur Bennett.

Prunella laciniata L., etc., in Surrey. — Lady Davy has recently shown me the above plant, which she detected in early July growing on the golf-links near Pyrford. There were five or six distinct and rather widely separated patches of the plant, which afforded a beautiful sight from its large, conspicuous, cream-coloured flowers. Although part of the links have once been under agrestal cultivation there are portions of original turf, and the *Prunella* grew with indigenous species; the probability is, I think, in favour of its being native. Lady Davy has also shown me *Dianthus deltoides* and *Centaurea Jacea* on the same area. A purple-flowered form of *Anagallis arvensis*, and interesting forms of *Scleranthus annuus*, *Polygonum aviculare*, and *Juncus bufonius* also occur. In the adjacent woodland Lady Davy pointed out to me *Helleborine media* and *Pyrola minor*. I saw true *Veronica aquatica* Bernh. in the vicinity. I may add that last autumn, at the Ridgway, Shere, I noticed about some artificial water a quantity of *Equisetum hyemale* pushing through the turf; this is probably a relic of the original flora, since of course it had not intentionally been introduced.—G. Claridge Druce.

Sagina procumbens L.—Some interesting specimens of this plant have been collected on Leith Hill, near Dorking, and forwarded to Kew by Mr. J. F. Duthie. The plants have the habit of typical *S. procumbens*, but all the flowers are completely "double." Each flower has four green sepals and up to twelve more or less alternating whorls each of four white petals. The sexual organs are either entirely absent or represented by the merest rudiments. That this abnormality is not uncommon is shown by several previous records, *e.g.* Gard. Chron. 1883, i. p. 796, and Wigand, Botanische Hefte, ii. Marburg, p. 119, 1887. A curious feature of Mr. Duthie's specimens is the development of a long conical receptacle which bears the white petals almost to its apex.—W. B. Turrill.

Orobanche purpurea Jacq. in Monmouthshire (v.-c. 35).—At the end of last June, a lady who lives about a mile west of Chepstow sent me some plants to name, one of which was *O. purpurea* Jacq. The last record I can find of its having been found in this district is by Dr. Hort in the *Phytologist* for 1852, p. 640, "in a lane S.W. of Chepstow." I have frequently searched for this plant in the district, but this is the first fresh specimen I have seen; it occurred, I understand, not far from the finder's house.—W. A. Shoolbred.

Kirkcudbrightshire Aliens.—On July 21 I saw *Impatiens parviflora* in some abundance at Southwick. On the following day I observed *Matricaria suaveolens* in very great abundance in the village of Duncrennan, extending along the roads leading out of it. I do not know when this was first recorded in England, but I have a perfectly distinct recollection of having seen it on waste ground at Kew in 1863, although it does not appear in the list published that year in the first volume of this Journal, p. 376: I fancy I then regarded it as a rayless form of *Anthemis Cotula*. Its distribution seems almost universal: I found it in July at the top of Syon Lane, near Brentford, facing the entrance to Osterley Park; on Aug. 18th I found it in some quantity in the village of Sneem, Co. Kerry. On July 22 I saw *Oxalis europæa* Jord., very tall and large, as a weed in the grounds surrounding the Catholic church at Dalbeattie.—James Britten.

Galinsoga parviflora in Herts.—I have found a specimen of *Galinsoga parviflora* growing as a weed near Harpenden.—Ruth Gimingham.

REVIEWS.

SUB-ALPINES AND ALPINES.

Sub-alpine Plants: or Flowers of the Swiss Woods and Meadows. By H. STUART THOMPSON, F.L.S. With 33 coloured plates (168 figures) by GEORGE FLEMWELL. 8vo, cloth. Pp. xv. 325. London: Routledge. 1912. Price 7*s.* 6*d.* net.

The Alpine Flora. By HENRY CORREVON AND PHILIPPE ROBERT. Translated into English and enlarged, under the author's sanction, by E. W. CLAYFORTH: with 180 reproductions of Studies in Water-colours. 8vo, cloth. Pp. 436. London: Methuen [no date]. Price 16*s.* net.

LAST year we noticed with approval Mr. H. S. Thompson's volume upon alpine plants: we now receive from the same publisher a companion volume, similar in size and price, in which he treats of the flowers of the Swiss woods and meadows to which the term "alpine" cannot rightly be applied.

There was we think distinctly room for a book of this kind. The average visitor to Switzerland does not frequent strictly alpine regions, but the plants which attract his notice are for the most part those at an elevation which is sufficiently high to yield a new and striking flora. For such a one, if possessed at the outset with a fair smattering of botanical knowledge, Mr. Thompson's book will be invaluable: his descriptions are clear and full, and as far as possible avoid technicalities and unusual terms, while he provides a useful glossary of words which are unfamiliar to the ordinary reader. Whether something in the direction of the keys which Gremli employs so successfully would not have been a help to the user of the book may perhaps be questioned; we are inclined to think that they might have been given, at least for the genera, and perhaps the more distinctive characters of each species might have been italicized. But those who are willing to take a reasonable and by no means excessive amount of trouble will find Mr. Thompson's book all that they require. He has taken much pains with the distribution of each species, which is carefully given, and he gives the altitude for each; the fact that he has himself been an extensive traveller and collector in the regions described gives to his observations a value which is absent from mere compilations. The introductory chapters on growing, collecting, and preserving are also based on personal experience; and the account of the more important alpine gardens is interesting.

We wish we could speak as favourably of the plates as we have been able to do of the letterpress. Mr. Thompson himself is satisfied with them, but we are unable to share his satisfaction. The specimens drawn are for the most part fragments thrown together in a heap in the middle of the plate, grouped apparently at haphazard but really, we suppose, owing to the exigencies of colour-printing: many are exceedingly weak—note the filiform peduncles of *Rosa alpina* on plate xii—and the colouring, although on the whole good, at times leaves something to be desired—*e. g.*

Adenostyles on plate xvii. The crowding together produces in most of the plates an unpleasing effect; and one wonders to what purpose there is so much waste of space. This is the more unfortunate because it is clear that Mr. Flemwell can draw: the Centaureas on plate xxii are excellent, as are the Phyteumas on plate iv.

M. Robert's illustrations of M. Correvon's book, on the other hand, are its most important feature, and indeed form the first half of the volume. They may not, especially at first sight, appeal to every one, for they are curiously Japanese in feeling—an effect due, in some measure, to the coloured background employed for each. The stiff almost rigid decorative treatment is in violent contrast with Mr. Flemwell's weak renderings; the colouring, too, although in the main accurate, leaves a curious impression, and the filling up of the whole space with the figure of the plant, which is noticeable in many instances, adds to the strangeness of the effect. All the same, these figures are on the whole extremely accurate, both in colour and in outline, and in them lies the chief interest of the book. The descriptive portion, though quite useful, is by no means as satisfactory as that of Mr. Thompson's volume; and the little scraps of French verse seem curiously out of place when the text is in English. There is an interesting general introduction, and the preface to this edition has some useful information about rock gardens.

In the absence of any date from the titlepage the English edition follows the example of the French original, which appeared in 1909; curiously enough, the translation is the cheaper book, as the original cost 25 francs. The titlepage is, as is usual with Messrs. Methuen's books, made hideous by a blue rubber-stamp—a form of decoration which we are glad to see Messrs. Routledge do not employ.

Fungoid Diseases of Agricultural Plants. By Jakob Eriksson, Fil.Dr. Translated from the Swedish by Anna Molander. London: Baillière. 1912. Demy 8vo, pp. xii, 208. 117 figs. (3 coloured). Price 7*s.* 6*d.* net.

Eriksson's book on the plant diseases caused by parasitic fungi was primarily intended to aid the Swedish cultivator in his fight against these troublesome organisms. In its translated form it is now offered to the British student of agriculture, and will be found to be equally serviceable in this country. There is no disease recorded within its pages that is not a danger to crops all over Northern Europe; for the parasite invariably follows the host and often indeed gains new vigour with new conditions of climate or locality.

There is a widespread opinion that fungoid diseases are increasing, and though much of the supposed increase may be accounted for by the advance in knowledge in scientific diagnosis of the disease, yet some of the new records, Eriksson thinks, are owing to the production of new varieties of host-plants which possess certain characteristics that may render them more liable to attack. Fungi that are normally saprophytic and harmless may become wound parasites and finally may develop into serious pests, and thus they also add to the number and variety of diseases.

Some two hundred different fungoid diseases are discussed by Eriksson; they comprise all the more important parasites that attack cultivated plants of garden, field, or forest in these latitudes. They are treated in systematic order, beginning with bacteria, which are responsible for no small number of root and stem roots, and so through the Phycomycetes to the higher orders of fungi. The parasites included in each group are described in popular language, which has been almost too literally translated, the perithecium, for instance, being always referred to as the "spore-case," the ascus as the "spore-bag." The translator gives us now and again a quaint and suggestive word such as uredo "sores" and puccinia "sores" for the sorus of spores that has burst through the epidermis of the leaf, and she fails occasionally to grasp the English equivalent, as in speaking of the cabbage "trunk"; but she has evidently given a faithful rendering of Eriksson's work.

Special attention is paid to remedial measures, and the account of the life-history of each fungus describes the time and stage at which it is most vulnerable, and when the treatment may be applied with the greatest prospect of success.

Eriksson is well-known as an exponent of the mycoplasm theory of propagation in plant-rusts, and, as we should expect, a full account is given of it in the chapter on Uredineæ. He insists that the reappearance year after year of *Puccinia graminis* can be accounted for in no other way: that it passes from generation to generation of the host-plant as a formless plasm in the cells of the grain.

The book is well indexed and well illustrated, three sets of figures of rusts being coloured. It is a welcome addition to the growing literature on plant diseases.

A. L. S.

Two Books on Diatoms.

Die Kieselalgen der Schweiz. Von Fr. Meister. Beiträge zur Kryptogamenflora der Schweiz. Bd. iv, Heft 1. Pp. vi + 255. Plates i–xlviii. Bern: 1912.

Contribuzioni Diatomologiche. By Achille Forti. Atti R. Istit. Veneto Sci. Lettere ed Arti. Venezia: 1912.

The volume first-named above is the best of the smaller systematic works on Diatoms which has appeared for some time. It gives short diagnoses, full measurements, and reasonably good figures of all the Diatoms as yet found in Switzerland. The author has collected Diatoms in all parts of Switzerland during the past ten years, and has also examined the numerous collections of other Swiss algologists. It is obvious that he has paid careful attention to specific characters and has confined himself to the discussion of Swiss forms only. In this respect the volume is an immense improvement upon Chodat's *Algues Vertes de la Suisse*, which forms part of the same series.

The volume commences with a brief historical account of the work on Swiss Diatoms, including a list of the literature, in which reference is made to the distribution of Diatoms in that country. This is followed by an account of the methods of collection, preparation, mounting, and labelling of specimens, &c. A list of the principal systematic works consulted during the preparation of the volume is then given, and a very brief description of the structure of Diatoms is prefixed to the systematic account, which is the main part of the volume.

The classification adopted follows in the main that originally put forward by Schütt in Engler & Prantl's *Pflanzenfamilien*. Useful keys are given to the families, genera, and species. The general typography is clear and good, and the specific descriptions are as concise as is consistent with the proper enumeration of distinctive characters. The plates are mostly very well executed, but the figures of the various species of *Nitzschia* are not very clear. In fact, there is still room for a work in which the numerous common species of this genus will be accurately figured in both valve and girdle aspects. The figures of *Cymatopleura Solea* are not good, and do not show the marginal beading of the valves very well. Moreover, the girdle view of this species, with its characteristic alternating undulations on the two sides, should be figured. One notices with pleasure that the author adopts the genus *Gyrosigma* Hassall (1845) instead of the more usual *Pleurosigma* W. Sm. (1853).

As would be expected, there are numerous species of "*Cymbella*" in the Swiss mountains, and the new figures of these species will be of great use to future workers. The author would, however, have been more consistent had he adopted the genus *Cocconema* Ehrenb. (1829), which is one year previous to, and also strictly synonymous with, *Cymbella* Ag. (1830). The curious absence of *Asterionella formosa* from the Swiss Diatom-flora is certainly worthy of mention.

The author describes thirteen new species and fifty-seven new varieties, and Latin diagnoses are given of all these new forms in an appendix. One of the proposed new species, *Synedra Schroeteri* Meister (1912), is most probably identical with *Synedra Lemmermannii* W. & G. S. West (1906), which was originally described from the plankton of Lough Corrib in Galway.

The twelfth contribution of Dr. Achille Forti's series deals with the classification of Diatoms, more particularly those which exhibit no movements. Forti's classification is based primarily upon the fact that some Diatoms exhibit spontaneous movements, whereas others do not. The author accepts O. Müller's interpretation of the movements as being due entirely to protoplasmic currents circulating in the raphe, and therefore the primary division he adopts separates all those Diatoms which possess a raphe —whether perfectly or imperfectly developed—from those which do not. The two sections are defined as follows:—

I. *Immobiles.*—Diatoms incapable of spontaneous movement. Conjugation unknown (perhaps inexistent), or possibly by the fusion of microspores.

II. *Mobiles.*—Diatoms which exhibit spontaneous movements. Conjugation known in all the families.

The author gives a detailed classification of all the genera of the "Immobiles" and of the first section of the "Mobiles" (Eunotieæ, Epithemieæ, Nitzschieæ, and Surirallea), and discusses the various groups from an evolutionary standpoint. It is an excellent contribution to the literature on Diatoms.

G. S. West.

Mikroskopisches Praktikum für Systematische Botanik. (I. Angiospermæ.) Von Professor Dr. M. Möbius. Sammlung Naturwissenschaftlicher Praktiker. Band I. Figs. 1–150. Berlin: Gebrüder Borntraeger. Pp. i–viii, 1–216. Price 6 M. 80 Pf.

This valuable addition to the literature of practical botany begins with a brief but useful introduction, containing excellent hints on the dissection of flowers and the making of permanent preparations. The "Systematischen Teil" then opens with a general account of the Angiosperm and the distinction between the Monocotyledon and the Dicotyledon; the floral dissection of *Capsella Bursa-pastoris* L. is exhibited in detail as an example.

The main subject of the book is an account of the chief floral characteristics of the principal families of Angiosperms. The system followed is that of Warming: families—one hundred and forty-four in all—are selected from every cohort for the purpose of practical investigation.

The abundant figures, clear, bold, and original, all illustrating salient and difficult points revealed in the course of dissection, are excellent, and the mere act of glancing through them yields no little instruction; all the principal families are represented. In some cases—for example, Grasses, *Scitamineæ*—we might wish for more illustrations to aid the student in the exhibition and understanding of the difficult and minute details of such families. At the same time the book does not pretend to be a complete textbook of systematic botany, but, as hinted in the preface, is intended to serve as a practical guide, to be used in conjunction with any of the standard works on systematics.

The "floral diagram," the darling of all the text-books since Eichler set the fashion, is conspicuous by its absence; and systematic botany is taught as a living subject. Organs are figured as they actually appear, and special difficulties are conscientiously dealt with. Herein lies the originality of the book and its undoubted value to students of every class, for how many have not been confounded by details of structure and arrangement of ovary, ovules, embryo, endosperm, and the like, often so minute and yet so fundamentally important? In dealing with difficulties of this kind, the student has had recourse too often to the theoretical floral diagram and its mechanical commission to memory; but this book is admirably calculated to stimulate him to work out every detail for himself, so adding to his permanent knowledge and stimulating him to research.

To students in England, where systematic botany is so apt to take a subordinate place in the curriculum, this concise and pleasing handbook should be especially welcome. Warming's system may be a little unfamiliar at first, but in too many cases systematic botany will be virtually a new subject, so that the use of Warming's text-book, which Professor Möbius (who is responsible for the latest German edition) recommends, will not involve any radical change. The type, the paper, and the binding are all in keeping with the excellence of the contents. The cover, of stiff, coarse, brown canvas, readily commends itself for use in the laboratory. Indeed, our only objection to the book is that it is not written in English.

H. F. Wernham.

BOOK-NOTES, NEWS, &c.

We are indebted to Mr. J. A. Wheldon for a copy of the Report for 1911 of the Botanical Exchange Club, of which he is the editor. There is a delightfully old-fashioned appearance about it—a return to the style of Report that was issued before the Club became a "Society of the British Isles" and its publication a repertory of miscellaneous botanical information. We note, however, a change of publisher—it bears the name of B. H. Blackwell, Broad Street, Oxford, and is priced at 3*s.* 6*d.* The Report as usual contains many valuable notes on individual species, as well as much information bearing upon distribution. Should space permit, we hope to quote some portions in a future number; meanwhile we reprint the note by the Messrs. Groves on the collecting of Batrachian *Ranunculi*; those who have seen their specimens of those troublesome plants will know that they are entitled to speak with authority on the subject:—

"Most of the water *Ranunculi* sent this year are either poor specimens or the plants are not in a satisfactory condition for determination. With such extremely variable plants it is essential that mature and complete specimens should be collected. In the young stages they are often not characteristic, and, with the exception of *R. hederaceus*, *Lenormandi*, *lutarius*, and *tripartitus*, they are not, in a normal season, really in good condition until late in May or the beginning of June. Specimens should have at least three fruiting heads on a stem, so as to show the direction and length of the peduncle and the fully-formed fruit. When flowers cannot be dried entire, loose petals should be preserved. Sub-terrestrial forms are by themselves unsatisfactory, and normal aquatic specimens can usually be collected in the neighbourhood. In the case of plants from swiftly-running streams or rivers it is desirable, if possible, to also collect them in the still or slow-flowing water of a pool or backwater. Floating leaves can frequently be found on a river form where the plant is in the densest masses, though absent elsewhere. There are few plants that will make more beautiful herbarium specimens than water ranunculi if they are properly treated, while if carelessly collected and dried none can present a more sorry and draggled appearance. The habitat should be fully stated on the labels."

With regard to the collection of Roses, Mr. Barclay and Major Wolley-Dod make suggestions which supplement each other. The former says: "What should be sent is a branch with branchlets. If that does not show mature prickles, a bit of *old* stem should be added with fully developed prickles. A shoot of the year is neither necessary, nor as a rule advisable. Several bits from the end of a flowering or fruiting branch are not nearly so valuable as a branch with its branchlets, the larger the better, for even then it is but a scrap of a whole plant." Major Wolley-Dod adds: "I would again impress upon members the importance of gathering well-advanced fruit, and specimens with a portion of the previous year's stem attached. This is especially important with the *Villosæ*."

There is room for a glossary of specific names, especially for gardeners and others who have not had the advantage of a classical education, and to provide this is the main purpose of Mr. G. F. Zimmer's *Popular Dictionary of Botanical Names and Terms with their English Equivalents* (Routledge; 2*s*. 6*d*. net). Although the Introduction states that terms used in Morphology and Physiology are included, we note, on a casual examination, the absence, *inter alia*, of *Choripetalæ*, *circumnutation*, *diplostemonous*, *gynophore*, *gynæceum*, *proterandrous*, &c. On the other hand, such mere blunders as "anularis" and "gramopetalus" are included. The geographical names are, in general, well done, though "West India" is an unusual mode of localizing Barbados, and "Mascarenensis" certainly does not always refer to Maskara in Algeria. Some of the trivial names are somewhat startling: "caninus" does not probably mean "as plentiful as dogs"; *Meum* is surely Bald-money and not Bad-money; and is *Conium* ever known as Herb Bennet, *Rumex nemorosus* as Wood-sorrel, or *Ficus religiosa* as Deodara? Misprints are numerous: "bracteosus" appears as a synonym for "Brahuicus"; "Micradenius" as "having small plants"; and "Mentosus" as "tin-shaped." The author "lays no claim to any deep knowledge on the subject of Botany," for which reason he should have secured some competent reviser for his book. "Rolled together like a paper bag" gives us no notion of the meaning of "convolutus"; "Hepaticæ, plants of the Liver-moss, Muscihepatici, tribe" looks queer; "the rush tribe" is hardly a good rendering of Butomaceæ, or "the alder tribe" for Cunoniaceæ; Aristolochiaceæ has nothing to do with *arista*, an awn; "Isosporus" does not usually mean "with equal number of spores"; and it is unfortunate to define "Archispermus" as "bearing naked seeds, fruit," or "Ladaniferus" as "yielding ladanum or laudanum." But what can be said for "Thymelæaceæ, plants of the Thuja, Arbor-vitæ, tribe"? Of course, initial capitals are constantly misplaced or omitted; whilst not to have indicated the pronunciation by accents has been to lose an opportunity.

There have, perhaps, been more than enough books issued of late both on nature-study and on trees, and some of these have referred approvingly to Arbor Day; but Mrs. Gregson's excellent *The Story of our Trees in Twenty-Four Lessons* (Cambridge University Press; 2*s.* 6*d.*) strikes a new and welcome note in combining with an account of tree-structure and tree-life practical lessons on tree-planting and tree-felling. The little book is well illustrated and got up, and useful appendixes are added on books of reference, shops where diagrams, lantern-slides, and material can be obtained, and questions for revision. If, however, the cultivation of acorns and horse-chestnuts is described, our familiar friend the broad bean, which is hardly a tree, might, perhaps, have been given a holiday.

The following explanations by students of the name Pimpernel in Tennyson's lines "The pimpernel dozed on the lea" are from an American paper, which guarantees their genuineness: "(1) The word pimpernel calls up in my mind the image of a pampered cur. He is a worthless brute who spends most of his time sleeping in the warm sunshine. (2) The pimpernel seems to me to be a small animal resembling an eel. It has short, rounded ears, and bright, beadlike eyes. As I imagine it, the pimpernel is lying half-asleep in the grass near the shore of a lake, ready to slip into the water at the slightest sound. (3) A pimpernel seems to me to be a tramp or gipsy. He lies on the bank in the sun with an old, battered hat drawn over his face. (4) I do not know what the word means, but it instantly suggests to me a small lizard covered with pimples or warts. The image flashed upon my mind as soon as the word was spoken, and is still vivid and distinct. Although I never heard the word before, I seem always to have known it, and to have attached this meaning to it. I am absurdly confident that this is the true meaning. Other students conceived of a pimpernel as a frog, a small deer, a dragonfly, or as a small tree or shrub like a prickly pear."

Newspaper Botany.—In connection with the British Mycological Society's visit to Worcester in the spring there was an exhibition of Mrs. Rea's original paintings of fungi. To this the *Worcester Daily Times* for May 17th devotes about half a column, from which we extract the following:—"Painting show the effect of the air upon the Lactarious group, which change from milk colour to purple when they are exposed. . . . . There are a number of paintings of fungi pests, including the hard woody Phalloide which destroys pines. . . . . Among the Gasteromycetes family is the Judas ear, a well-known fungus which attacks elder trees. . . . . The Pezazæ group includes a large number of brilliant little green fungi which grow on decaying stalks in woods. . . . . One of the largest specimens is the giant scaled agaric, which Mr. Carleton Rea found, and which he has named 'Grantis Rea.'" This is probably *Pholiota grandis* Rea.

We regret to record the death of Mr. Allan Octavian Hume, which occurred at his residence, Upper Norwood, on July 3, and of Dr. Mordecai Cubitt Cooke; we hope to give some account of their botanical work in an early issue.

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Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains. In 1896 it became necessary to increase the size of the Journal, owing to the number of papers sent for publication: the number of plates was at the same time augmented.

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NOTES ON THE FLORA OF SHETLAND,

WITH SOME ECOLOGICAL OBSERVATIONS.

By William West, F.L.S.

(Concluded from p. 275.)

List of the Vascular Plants noted.

O. = Ollaberry and district in the north of the Mainland.
R H. = Ronas Hill in the north of the Mainland.
U. = the district about Baltasound in Unst.

A few *additional* plants were noted during a short time between Scalloway and Lerwick; these are indicated by *Le* or *Sc.*

Botrychium Lunaria Swartz. *U.* In a few localities on undisturbed land.

Polypodium vulgare L. *U, O.* In rock crevices at low elevations only.

Lastræa aristata Britten & Rendle. *U, O.* Scarce.

Asplenium Adiantum-nigrum L. *U.* Only on one set of rocks, and quite dwarfed; the height of the plants I measured from rhizome to leaf-tip averaged one and a quarter inches. Fairly plentiful.

Blechnum Spicant With. The most frequent fern by far.

Pteris aquilina. U, O. Only a few plants were seen in Unst, almost at sea-level. Near Ollaberry it was only seen a little above the Whaling Station at the foot of Ronas Hill; here it was on the banks of a rill in fair quantity, but dwarfed, though not rising to 200 ft. above sea-level.

Equisetum limosum L. *U, O.* Local.—*E. sylvaticum* L. *O.* Local.—*E. palustre* L. *U, O.*—*E. arvense* L. *O.*

Lycopodium alpinum L. *R. H.* At 1200 to 1400 ft. mostly.—*L. Selago* L. *R. H.* From 500 to 1400 ft.

Selaginella selaginoides Link. *U, O.* Very abundant on the Serpentine in Unst, but rare near Ollaberry.

Juniperus sibirica Burgsd. *R. H.* Only one plant was seen on the granite débris of the lower part of Ronas Hill in the ascent from Colla Firth; I made it out to be *J. nana* Willd.

Sparganium natans L. *U.* Loch of Cliff. The specimens I got were 5½ ft. long and were not selected.

Triglochin palustre L. *O.* Only seen in one marshy place where it was frequent.

Potamogeton natans L. *U, O.*—*P. polygonifolius* Pourr. *U, O.*—*P. perfoliatus* L. *U.* In Loch of Cliff.

Schœnus nigricans L. *U.* Sparingly on sloping ground and very much dwarfed, in moist moor-pastures on Serpentine.

Eleocharis palustris Roem. & Schultes. *U, O. Le.*

Scirpus cæspitosus L. *U, O.*

Eriophorum vaginatum L. *U.*—*E. polystachion* L. *U, O.*

Carex dioica L. *U, O.*—*C. pulicaris* L. *U, O.*—*C. echinata* Murr. *O.*—*C. leporina* L. *U.*—*C. Goodenowii* Gay. *U,* in variety. *O.*—*C. panicea* L. *U, O.*—*C. pilulifera* L. *U, O.*—

C. flacca Schreb. *U, O.*—*C. flava* L. *U, O.*—*C. Hornschuchiana* Hoppe. *O.*—*C. binervis* Smith. *U, O.*—*C. rostrata* Stokes. *U.*

Phalaris arundinacea L. *U, O.*

Anthoxanthum odoratum L. *U, O. Le.*

Alopecurus geniculatus L. *U.* Only seen in one place in fair quantity.

Nardus stricta L. *U, O.*

Agrostis canina L. *U, O.*—*A. alba* L. *U, O.*—Var. *stolonifera* L. *U, O.*—*A. tenuis* Sibth. *U, O.*—Var. *pumila* L. *U, O.*

Holcus lanatus L. *U, O.*

Aira cæspitosa L. *O.* Very local indeed in parts I traversed. —*A. flexuosa* L. *U, O.* This includes the mountain form on Ronas Hill.—*A. præcox* L. *U, O.*

Arrhenatherum elatius Mert. & Koch. *U.*

Sieglingia decumbens Bernh. *U, O.*

Molinia cærulea Moench. *U, O.* Dwarfed.

Poa annua L. *U, O.*—*P. trivialis* L. *U.*

Glyceria fluitans Brown. *U, O.*

Cynosurus cristatus L. *U, O.*

Dactylis glomerata L. *U.*

Festuca ovina L. *U, O.* Almost always viviparous.

Triticum repens L. *U, O.*

Lolium perenne L. *U, O.*

Juncus conglomeratus L. *U, O.*—*J. inflexus* L. *Le.*—*J. trifidus* L. Ronas Hill, seen only in one place near the top.—*J. acutiflorus* Ehrh. *U, O.*—*J. bulbosus* L. *U, O.*—*J. squarrosus* L. *U, O.*—*J. bufonius* L. *O.* Uncommon.

Luzula sylvatica Gaud. *U.* On mountain moorland.—*L. campestris* DC. *U, O.* A little, quite dwarfed.—*L. multiflora* Lej. *U. O.*—*L. spicata* DC. *R. H.* Rare on summit.

Scilla verna Huds. *U.* Common on Serpentine. *O.* Sparingly.

Narthecium Ossifragum Huds. *U, O.* In some places showing a yellowish brown sheen that was characteristic at a considerable distance.

Iris Pseudacorus L. *U, O.* Frequent.

Orchis latifolia L. *O.* Local.—*O. maculata* L. *O.* Local.

Gymnadenia conopsea Brown. *U.* Rare.

Habenaria viridis Brown. *U.* Very frequent on Serpentine.

Salix repens L. *U, O.* Not at all abundant for the nature of the country.—*S. herbacea* L. *R. H.* Plenty about the summit, but very dwarfed, plants one inch long with dehisced capsules.

Alnus glutinosa Gaertn. *Le.* A few planted with sycamores and willows near a house.

Urtica urens L. *O.* Only near houses; it only occurs thus in Yorkshire.—*U. dioica* L. *U, O.* Scarce.

Humulus Lupulus L. *U.* Cultivated as a climber in a garden.

Ulmus campestris L. *U.* Only in the small cushioned plantation of sycamores.

Polygonum amphibium L. *U.* In Loch of Cliff.—*P. aviculare* L. *U, O.*

Rumex obtusifolius L. *U, O.*—*R. crispus* L. *U, O.*—*R. aquaticus* L. *O.* In a deep rill with *Phalaris arundinacea*, &c.—*R. Acetosa* L. *U, O.*—*R. Acetosella* L. *U, O.*

Montia fontana L. var. *rivularis* Gmelin. *U, O.*

Chenopodium album L. *O.*

Atriplex Babingtonii Woods. *U. Le.*—*A. hastata* L. *U.* A weed of cultivation; some of the plants were attacked by the fungus *Phyllosticta atriplicis* Desm.

Silene maritima G. Don. *U.* Chiefly on the Serpentine.—*S. acaulis* L. *U.* This plant was common at not more than 100 ft. elevation; in some places there were several hundred capsules close together on each patch.

Lychnis Flos-cuculi L. *U, O.*—*L. alba* Mill. *U, O.* Very little in either place.—*L. dioica* L. *O, U.* Not abundant in either place.

Sagina procumbens L. *U, O.*—*S. nodosa* Fenzl. *U.* Very dwarfed on Serpentine. *O.* Very little of it.

Honkenya peploides Ehrh. *U.* Only in one place at Baltasound.

Arenaria norvegica Gunn. *U.* On Serpentine only near Baltasound.

Stellaria media Vill. *U, O.*—*S. neglecta* Weihe. *U, O.*—*S. uliginosa* Murr. *U, O.*

Cerastium viscosum L. *O.* Not frequent.—*C. vulgatum* L. *O.* Rare. — *C. tetrandrum* Curt. *U.* On Serpentine, very dwarfed.—*C. arcticum* Joh. Lange, var. *nigrescens* Edm. *U.* On Serpentine, near Baltasound.

Spergula arvensis L. *U, O.* In both cases a weed of cultivation.

Thalictrum alpinum L. *O, U.* Frequent at 100 ft. above sea-level in Unst, but only sparingly on schistose rocks, near Ollaberry, at less than 100 ft., not seen at all on the granite, even at over 1400 ft.

Ranunculus Flammula L. *O, U.* Not common; the creeping form occurs about lake-margins.—*R. acris* L. *O, U.* Not common; several forms.—*R. repens* L. *O, U.* Not common.

Caltha palustris L. *O, U.* Uncommon.

Arabis petræa Lam. *U.* Frequent on exposed Serpentine.

Cardamine pratensis L. *U.* In one place only. *Sc.*

Sinapis arvensis L. *U.* Among crops.

Draba incana L. *U.* On exposed Serpentine, mostly very dwarfed, especially when compared with that on the carboniferous limestone of the Yorkshire hills.

Cochlearia alpina Wats. *U.* On Serpentine. Very dwarfed plants.

Capsella Bursa-pastoris Med. *O, U. Le.* Very uncommon.

Drosera rotundifolia L. *U, O.* Not by any means frequent in any place I visited.

Parnassia palustris L. *U.* A native told me of two stations for this near the shore. The places described were similar to some northern ones; I have seen it in such as the northern shore of Caithness. I did not see it inland.

Spiræa Ulmaria L. *U, O.*

Alchemilla vulgaris L. *U.* Rare.—*A. alpina* L. *R. H.*, at 1400 ft. and above; dwarfed forms. I saw it nowhere else.

Potentilla Anserina L. *U. O.*—*P. sylvestris* Neck. *U, O.*

Comarum palustre L. *U, O.*

Rubus "fruticosus" L. *U.* Only one patch was seen in a pasture-field near the stone fence.—*R. saxatilis* L. *U.* On the Serpentine only where wind-swept; a distinct reddish brown to nigrescent dwarf variety with rugose leaves, usually two fully grown with a smaller third one, with under surfaces pressed to the ground.*—Var. *borealis.* Differs from type in the plants being from ¾ to 1 in. high; leaves spread out horizontally on the ground, three in number, two of which are fully grown, the third smaller, 1½ to 2 in. in length and breadth, largest leaflets 1¼ in.; light to dark brownish green above, with scattered hairs; below pale with prominent hairy veins, margins shortly and silkily ciliate, one or two delicate aciculi on the long shoot (15 in.).

Geum rivale L. *U.* Only in one place.

Rosa canina L. *U.* Only one plant was seen at the edge of an enclosed pasture.

Pyrus aucuparia Ehrh. *U.* I was told by a native, who knew common plants, that this was the only native tree, and that it occurred in some ravines; I only saw it where planted among Sycamores.

(*Ulex europæus* L. *U.* Some small bushes in a hollow in an enclosed field at Baltasound, where I was told they had been planted.)

Trifolium pratense L. *U, O.*—*T. repens* L. *U, O.*

Lotus corniculatus L. *U, O.*

Anthyllis Vulneraria L. *U, O.* In Unst I only saw this on the Serpentine.

Vicia Cracca L. *U. O.* Among rocks in both places; very dwarfed.—*V. angustifolia* L. *U.*

Lathyrus pratensis L. *U, O.*

Geranium pratense L. *U.* One patch in a field near a minister's house, in the very neglected garden of which there was also a fine clump; I therefore felt certain of its introduction.

Linum catharticum L. *U.*

Radiola millegrana Sm. Near Scalloway; in one place only.

Polygala serpyllacea Weihe. *U, O.* Not frequent.

Callitriche palustris L. *U, O.*—*C. stagnalis* Scop. *U, O.*

Empetrum nigrum L. *U, O.*

(*Acer Pseudoplatanus* L. Planted and poor. *U, Sc.*)

Hypericum humifusum L. *U.* Only in one place.—*H. pulchrum* L. *U, O.*—Among rocks in both places.

Viola canina L. *U, O.*—*V. tricolor* L. *U.* Among and near crops.

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* I give a copy from my notes of what I wrote down as a description of fresh specimens. It is probably but a dwarf form due to its constant insolation and its wind-swept habitat.

Epilobium palustre L. *U, O.*

Myriophyllum alterniflorum DC. *U, O.*

Hippuris vulgaris L. *U.* Rare.

Hydrocotyle vulgaris L. *Sc.*

(*Ægopodium Podagraria* L. *O.* Within an enclosure near a house; evidently an old introduction; none seen elsewhere.)

Angelica sylvestris L. *U, O.*

Heracleum Sphondylium L. *Sc.* Only seen here, and I consider it as a weed of cultivation.

Chærophyllum sylvestre L. *U, O.*

Arctostaphylos Uva-ursi Spreng. *R H.* Very local, but plentiful among granite débris in one restricted part of the ascent from Colla Firth.

Calluna vulgaris Hull. *U, O.*

Erica Tetralix L. *U, O.*—*E. cinerea* L. *U, O.*

Vaccinium Myrtillus L. *U, O.*—*V. uliginosum* L. *U.* Abundant towards the lighthouse near the extreme north of Unst, on Hermaness Hill, at 600 to 650 ft. I was unable to find any fruit. On Ward's Hill, in Hoy, I have seen abundance of fruit on *Arctostaphylos alpina* at the same season.

Primula acaulis L. *U, O.*

Glaux maritima L. *U.* At Baltasound only, and not abundant.

Statice Armeria L. *U.* This was not noticed anywhere near Ollaberry, nor on the granite of the whole of Ronas Hill.

(*Fraxinus excelsior* L. *Sc.* Planted only near houses.)

Gentiana campestris L. *U.* Very abundant in many places.

Menyanthes trifoliata L. *U, O.*

Mertensia maritima S. F. Gray. *U.* I was told by a native that this plant occurred in one place on the shore; he described the plant correctly, and the taste of the leaves.

Myosotis cæspitosa K. F. Schultz. *O.*—*M. arvensis* Hill. *U, O.* —*M. versicolor* Sm. *U.*

Thymus Serpyllum L. *U.* (In the Benthamian sense—which applies to many other species in this list.) *R H.* On the summit-plateau.

Prunella vulgaris L. *U, O.*

Lamium purpureum L. *O.* Only sparingly about cultivated land.

Galeopsis Tetrahit L. *U, O.* Only in cultivated fields, the form with pale purple flowers.

Stachys palustris L. *U, O.*

Linaria vulgaris Mill. *O.* One plant only, seen among cabbages.

Pedicularis palustris L. *O.*—*P. sylvatica* L. *U, O.*

Rhinanthus Crista-galli L. *U, O.*

Euphrasia borealis Towns. *U, O.*—*E. gracilis* Fries. *U.*—*E. Rostkoviana* Hayne. *U.*—*E. latifolia* Pursh. *U.*

Veronica agrestis L. *U.* Only one plant was seen on a roadside.—*V. officinalis* L. *U.*

Pinguicula vulgaris L. *U, O.*

Utricularia minor L. *U, O.*

Plantago maritima L. *U, O.*—Var. *lanata* Edm. *U.*—On

Serpentine only.—*P. lanceolata* L. *U, O.*—Var. *sphærostachya* Roehl. *O.*—*P. major* L. *U, O.*

Galium Aparine L. *U.* Only seen at Baltasound, where it had evidently (judging by its associates) been introduced.—*G. verum* L. *O.* Very local.—*G. saxatile* L. *U, O.*—*G. palustre* L. *U.*

(*Sambucus nigra* L. *U.* Only seen when planted in gardens.)

(*Lonicera Periclymenum* L. Seen on and about houses only, though one native said that it was from *wild* plants.)

Scabiosa Succisa L. *U, O.* In some places between Ollaberry and Ronas Hill, especially near the Whaling Station at the head of Ronas Voe; this gave a sheen to the landscape at a considerable distance.

Lobelia Dortmanna L. *O.*

Jasione montana L. *U, O, Sc.*

Tussilago Farfara L. *O.* Very little of this was seen, and that only near oatfields.

Bellis perennis L. *U, O.*

Solidago Virgaurea L. *U, O.* Short forms only (= var. *Cambrica* Huds.).

Gnaphalium uliginosum L. *Sc.* Only in one place.—*G. sylvaticum* L. *O.* One plant only was seen in the middle of a pasture.

Antennaria dioica Gaert. *U, O.* Frequent.

Achillæa Ptarmica L. *U, O.*—*A. millefolium* L. *U.* Mature plants sometimes barely two inches high. *O.*

Matricaria inodora L. *U, O.* As a weed of cultivation in both places.—*M. suaveolens* Buch. Abundant about the landing-place only, Baltasound.

Tanacetum vulgare L. *U, O.*

Senecio vulgaris L. *U, O.* Rare.—*S. Jacobæa* L. *O.* A little only, and *very* local.—*S. aquaticus* Huds. *O.*

(I collected one or two small rosettes of leaves on the summit-plateau of Ronas Hill; I have no doubt as to these being very dwarfed *Saussuræa alpina*, with which I am familiar both in Britain and Norway, but as the specimens have been misplaced or lost, I leave this species out of the list.)

Carduus lanceolatus L. *U, O.*—*C. arvensis* Robson. *U, O.*—*C. palustris* L. *O.*

Hypochæris radicata L. *U.* Only a little in one place.

Leontodon autumnalis L. *U, O.* Abundant in both places, even to the summit of Ronas Hill (1475 ft.). All I examined seemed to be var. *pratensis* Koch., involucres shaggy, plants three to four inches high, with one inflorescence.

Taraxacum officinale Web. *U, Sc.* Seldom seen, and little of it.

Sonchus arvensis L. *U, Sc.* A weed of cultivation.

These imperfect notes may be of some use to future investigators and (as previously indicated) apply only to a part of Shetland, and also represent what is possible to be fairly easily observed, when doing other work also, during but part of one month. They represent part of a preliminary examination of the flora with an ecological bearing; the other and greater part of the investigation, to which most time was devoted, was cryptogamic, the full results of which are not yet ready for publication. No shore-work was attempted.

I may also add that, as vascular plants were quite a secondary consideration, I had never examined a Flora of Shetland, and the only vascular plants I knew to occur there were *Arenaria norvegica* and some *Hieracia*; as to the latter, I had some recollection that I had seen a note of Beeby's on them some years before, and I may here note that I did not come across one species.[*] I have made no attempt to make critical splits of such genera as *Rhinanthus*, *Cochlearia*, &c., only noting what could be determined without any doubt, the only exception being *Euphrasia*, and those named certainly fit Townsend's descriptions. A few of the plants may be new to *Topographical Botany*, and others confirmatory of previous doubtful records. A few of the more critical plants have not yet been examined.

LICHENS.

I gave considerable attention to the collection of lichens in the places visited, as I had never seen or heard of any records of them from there. As native trees are practically absent, I did not expect any corticolous or shade-loving species; the few I got were from some planted and stunted trees near dwellings. The rocks in the places visited were mostly gneiss, mica schist, granite, and Serpentine. The exposed mica schist and gneiss in different places had a very similar and somewhat uniform flora. The granite was usually very bare on account of rapid weathering, and also by reason of this the outstanding rocks were scarce. The Serpentine also weathers fast, and is very unproductive of lichens. The following is a list of those that have been determined. As the list is a scanty one on account of the lack of trees, &c., the names of the Tribes, Subtribes, and Orders have been left out. The arrangement is that of A. Zahlbruckner in Engler & Prantl's *Die Natürlichen Pflanzenfamilien.*

My old friend Mr. Thos. Hebden has kindly examined the greater part of them, and I have to thank him for his invaluable help. Miss A. Lorrain Smith, F.L.S., has also been kind enough to clear up a few of the more doubtful species.

Ticothecium pygmæum Koerb. (now considered as a fungus) occurred near Ollaberry on barren crustaceous lichens.

O = near Ollaberry.
R H = Ronas Hill.
U = Unst.
B U = Baltasound, Unst.
O to *H* = Ollaberry to Hillswick.
N U = North Unst.
S U = South Unst.
Sc. = Scalloway.
H = Hillswick.
C F = Colla Firth.
L = Lerwick.
N-w U = North-west Unst.

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[*] I had previously visited South Shetland for a few days, but my attention then was entirely devoted to the cryptogams.

Verrucaria Dufourii DC. *B U.* Frequent on Serpentine.—*V. maura* Wahl. *O, L, U.* On both Archæan rocks and Serpentine.—*V. muralis* Ach. *O, U.*—*V. nigrescens* Pers. *U.* On both Archæan rocks and Serpentine.

Dermatocarpon aquaticum A. Zahlbr. (*Endocarpon fluviatile* DC.). *C F* to *R H.* At the edge of a lakelet in the bed of a stream.

Sphærophorus coralloides Pers. *O, N U, C F, R H, H, S U, B U.* On Serpentine.—*S. compressus* Ach. *S U, R H, N U, O.*

Arthonia varians Nyl. *B U.*

Opegrapha atra Pers. *L.* On *Acer* and *Salix*. *B U.* On *Acer*.—*O. confluens* Stiz. *O, R H, B U.*—*O. saxicola* Ach. *U, Sc.*

Lecidea albocœrulescens Ach. *R H, N-w U.* — *L. auriculata* Th. Fr. var. *diducens* Nyl. *O.*—*L. confluens* Ach. *N-w U, O.*—*L. contigua* Fr. *O, B U, R H, H.*—Var. *calcarea* Leight. *U, L.*—Var. *platycarpa* Fr. *U.*—*L. crustulata* Koerb. *S U, C F* to *R H.*—*L. Dicksonii* Nyl. *R H.*—*L. dubia* Hook. *L.* On *Acer*. *U.*—*L. fuliginosa* Tayl. *U.*—*L. goniophila* Schaer. *B U, N-w U.*—*L. griseoatra* Schaer. *U.*—*L. jurana* Schaer. *N U, S U.*—*L. Kochiana* Hepp. *N-w U, R H.* — *L. lactea* Floerke. *B U, R H, N U, S U, L.*—*L. lapicida* Ach. *O, R H.*—*L. latypea* Ach. *O, N-w U, B U.* On Serpentine.—*L. lithophila* Ach. *B U.*—*L. parasema* Ach. *B U.* On *Acer*. —Var. *elæochroma* Ach. *L.* On *Acer*.—*L. plana* Nyl. *O, C F* to *R H.*—*L. protrusa* Fr. *B U.*—*L. rivulosa* Ach. *N U, S U, O, R H, L* to *Sc, C F.*—*L. sorediza* Nyl. *B U.*—*L. subumbonella* Lamy. *O.*

Bacidia inundata Koerb. *U.*

Rhizocarpon confervoides DC. *O* to *H, U.*—*R. geographicum* DC. *N U, O, R H.*—*R. Œderi* Koerb. *O.*—*R. petræum* Massal. *O, R H, B U.* Both on Archæan rocks and Serpentine.

Pycnothelia papillaria Duf. *U.*

Cladonia asperella Cromb. *L, Sc, U.*—*C. cervicornis* Schaer. *C F, O, R H, U.* On Serpentine.—*C. coccifera* Schaer. *O, N U, Sc, H, B U.*—Subsp. *C. pleurota* Cromb. *B U.*—Var. *frondescens* Harm. *U.* — *C. crispata* Nyl. *U, O, Sc.* —Var. *cetrariæformis* Wain. *L.*—*C. digitata* Hoffm. *R H, N U, O, B U.*—*C. fimbriata* Fr. *L, N U, R H, O, B U.* — Var. *subcornuta* Nyl. f. *nemoxyna* Coëm. *O.* — Var. *tubæformis* Wain. *R H, Sc, O.* — *C. furcata* Hoffm. *R H, Sc, O, U.* Sometimes on Serpentine.—Var. *palamæa* Nyl. *R H, O.*—Var. *corymbosa* Nyl. *R H.*—Var. *racemosa* Flk. *O* to *H.*—f. *subulata* Flk. *S U, N-w U.*—Var. *scabriuscula* Coëm. *B U.* On Serpentine. — *C. gracilis* Hoffm. *O.* —Var. *gracillima* Norrl. *R H.* — f. *subulata* Harm. *R H.* — *C. macilenta* Hoffm. *L, U, O* to *H.*—*C. pungens* Floerke. *O, U.*—Subsp. *C. muricata* Cromb. *U.* On Serpentine. — *C. pyxidata* Fr. *B U, N-w U, S-w U, R H, O.*—*C. squamosa* Hoffm. *L, O, R H, U, Sc.*—f. *turfacea* Wain. *U, R H.* — *C. verticillata* Floerke f. *evoluta* Wain. *O, Sc, N U, C F, R H, B U.*

Cladina amaurocræa Nyl. *B U.*—*C. rangiferina* Nyl. *O.*—*C. sylvatica* Nyl. *N U, S U, O, R H.* Spermogoniiferous from both Unst and Ollaberry. — f. *lacerata* Nyl. *U.* — f. near var.

alpestris Nyl. *N U.* — *C. uncialis* Nyl. *O, U, H.* — f. *obtusata* Nyl. *U.*—f. *integerrima* Wain. *U.*—f. *dicræa* Ach. *R H, U.*

Stereocaulon paschale Gray. *O* to *H, R H.* — *S. denudatum* Floerke. *R H.*

Bæomyces æruginosus DC. *Sc.*

Gyrophora cylindrica Ach. *W* of *R H.* — *G. proboscidea* Ach. *R H.*—*G. torrefacta* Cromb. *N U, O, C F* to *R H.* Frequent and the most common species by far of this district on red granite.—*G. flocculosa* Turn. & Borr. *R H.*

Ephebeia hispidula Nyl. *O.*

Ephebe pubescens Nyl. *R H.*

Lichina confinis Ag. *N-e U.*

Collema furvum Ach. *B U.* On Serpentine. — *C. nigrescens* Ach. *B U.* On Serpentine.—*C. pulposum* Ach. *U.*

Leptogium scotinum Fr. var. *sinuatum* Malbr. *B U.* On Serpentine.

Pannaria brunnea Nyl. *L.*

Psoroma hypnorum Nyl. *O.*

Peltigera canina Hoffm. *U.* On Serpentine.—*P. polydactyla* Hoffm. *U.*—*P. spuria* Leight. *L, O.*

Pertusaria dealbata Nyl. *U, C F* to *R H.*

Lecanora atra Ach. *O, L, Sc, N U, B U.* On Serpentine.—*L. allophana* Nyl. *B U.* On *Acer.*—*L. albella* Ach. *U, R H.*—*L. badia* Ach. var. *cinerascens* Nyl. *O, L.* — *L. calcarea* Somm. *N-w U.*—*L. coilocarpa* Nyl. *U.*—*L. confragosa* Nyl. *B U.* On Serpentine.—*L. fuscata* Nyl. *R H.*—*L. gangaleoides* Nyl. *N-w U, S U.* — *L. gibbosa* Nyl. var. *lusca* Nyl. *U.* — *L. glaucoma* Ach. *C F* to *R H, U.*—Var. *complanata* Leight. *O* to *H.*—*L. Hageni* Ach. *B U.* — *L. irrubata* Nyl. *O, R H.* — *L. milvina* Ach. *Nw- U.* — *L. parella* Ach. *O, L, Sc, R H, C F, B U.* Both on Archæan rocks and Serpentine. *R H.* Some peculiar forms with gyrocheiloid apothecia occurred on the much exposed Archæan rocks, the examples often measured one or two feet across.—*L. polytropa* Schaer. *H, N-w U, O.*—Var. *ustulata* Koerb. *U.*—Subsp. *L. intricata* Nyl. *B U.* On Serpentine. — *L. prosechoides* Nyl. *O, U.*—*L. squamulosa* Nyl. *U.*—*L. subfusca* Nyl. *U.*—Var. *campestris* Nyl. *O, U.* On Serpentine, and sometimes on maritime rocks.—*L. sulphurea* Ach. *O, N U, B U.* On Serpentine. — *L. tartarea* Ach. *N U, B U, O.*—Var. *frigida* Ach. —*L. vitellina* Ach. *R H.*—*L. epixantha* Nyl. *U.*

Parmelia fuliginosa Nyl. *R H, H, C F.* — *P. lanata* Wallr. *R H.*—*P. omphalodes* Ach. *O, U, R H,* with apothecia; *L,* with apothecia. —Var. *panniformis* Ach. *U.* — *P. perlata* Ach. subsp. *P. ciliata* Nyl. *O* to *H.* — *P. physodes* Ach. *O, U.* — f. *tubulosa* Mudd. *E* of *R H.* — *P. saxatilis* Ach. *R H, U, O, H, L, Sc.*—Var. *furfuracea* Schaer. *O, U.*—*P. sulcata* Tayl. *R H, O, B U.* On Serpentine.—*P. tristis* Nyl. *R H, O* to *H.*—*P. trichotera* Hue. *B U.* On Serpentine.

Cetraria aculeata Fr. *O, Sc, U.* Sometimes on Serpentine.—Var. *muricata* Ach. *L.*—*C. islandica* Ach. *O.*

Platysma glaucum Nyl. *O.*

Ramalina cuspidata Nyl. *O, L, B U, N U.*—f. *gracilis* Oliv. *U.*—f. *rugosa* Oliv. *N-w U.*—Var. *crassa* Nyl. *O* to *H.* On red granite.—f. *lobulifera* Harm. *O* to *H.* On red granite.—*R. inæqualis* Nyl. *N U.*—*R. scopulorum* Ach. *O, B U, H, N U.*—Var. *incrassata* Nyl. *O* to *H.*—*R. subfarinacea* Nyl. *N U, B U.* Chiefly on walls exposed to a drive of wind.

Thamnolia vermicularis Schaer. *R H.* Scattered among *Rhacomitrium lanuginosum.*

Alectoria jubata Nyl. *O.* On rocks not far from the sea, but away from highest tidal influence.

Placodium murorum Leight. subsp. *P. decipiens* (Arn.). *O, L.*—*P. sympagea* (Ach.). *L, U.* On Serpentine.

Leproloma lanuginosum Nyl. *N U.*

Blastenia ferruginea (Huds.) Arn. var. *festiva* Nyl. *N U, S U.*

(*Xanthoria*) *Physcia parietina* De Not. *O, R H, L, Sc, N U, B U.* On Serpentine.—Var. *ectanea* Nyl. *B U.* On Serpentine.—(*X.*) *P. lychnea* Nyl. *L.* Abundant on rocks much frequented by gulls, along with a *Prasiola* (not yet examined). This latter genus and the *Xanthoria* section of *Physcia*, together with *Ulva*, seem to always demand a greater nitrogenous supply than most other cellular plants, excepting Fungi and Splachnaceæ.

Buellia disciformis Mudd. *B U.* On Serpentine.—*B. myriocarpa* Mudd. *O, U.* In both places saxicolous.

Physcia aquila Nyl. *U, O, L.*—*P. cæsia* Nyl. *O* to *H.*—*P. stellaris* Nyl. var. *leptalea* Nyl. *R H.*—*P. speciosa* Nyl. *O, B U.*—*P. tenella* Nyl. *B U.* On Serpentine. *O.*—*P. ulothrix* Nyl. var. *virella* Sm. *O.*

A REMARKABLE FORM OF *DICRANELLA HETEROMALLA* Schimp.

By H. N. Dixon, M.A., F.L.S.

In May of this year Mr. C. P. Hurst sent me a gathering of *Dicranella* which presented a very unusual appearance. The foliage was unmistakably that of *D. heteromalla*, but the capsules were quite unlike those of that species. Instead of being elongate, castaneous brown, inclined, and plicate when dry, on long straw-coloured setæ, they were short, small, deep reddish brown, almost erect and symmetrical, smooth when dry, wide-mouthed, and on very short, red, often deep red, setæ, so as to be almost immersed in the tufts. They presented indeed very much the appearance of the fruit of *D. varia*, and this was enhanced when, as was occasionally the case, the peristome, just expanded, showed the long, deep purple teeth characteristic, of some forms especially, of that species. There seemed to be a good *à priori* case for a hybrid form, viz., *D. heteromalla* ♀ × *D. varia* ♂. Careful search by Mr. Hurst, however, entirely failed to detect the presence of *D. varia* in the immediate vicinity, while on the other hand it showed that the fruiting plant in question covered a much wider range than was at first supposed. It was originally found along the side of a trench on Burridge Heath, half a mile east of

Great Bedwyn, near Hungerford, Wilts. Subsequently Mr. Hurst traced it for a considerable distance in the immediate neighbourhood, extending for quite two hundred yards, and forming plentiful masses about the roots of trees; in fact, it seemed as if this abnormal-fruited form was the prevailing one in the locality, the normal form of fruit not being seen. Later on Mr. Hurst traced it for nearly half a mile on Burridge Heath, where it was quite abundant, and where a little of the normal *D. heteromalla* fruit occurred with it; subsequently it turned up a mile and a quarter away from its original station, on a bank at Stype Wood; later on at a still greater distance, in Savernake Forest, in two localities, about four miles from the original station.

The abundance of capsules, the apparently constant absence of *D. varia* in association, and the great quantity of the male plant of *D. heteromalla* present, made it pretty clear that the hybrid theory must be abandoned, and some other explanation sought. This was confirmed and indeed demonstrated by some of the later gatherings sent me by Mr. Hurst. For not only did many intermediate forms occur between the extreme form as described above and normal *heteromalla* setæ and capsules, but on one or two tufts I found, side by side with the abnormal capsules and on the same stems, setæ of last year's fruit exhibiting no difference from ordinary *heteromalla*; while later on, tufts gathered in July presented young setæ of the present year which were evidently on the road to become the normal, elongate, pale yellow setæ characteristic of the normal plant.* Clearly therefore the peculiar capsules represent a state or form merely, and that not so much a local as a temporary state, due, one would suppose, to some climatal conditions. What these may have been, however, I cannot suggest. The abnormal capsules appeared to mature principally about the end of May and early part of June. Midwinter is the usual maturing time for the species, but it varies greatly, and I do not think the simple fact of retardation would itself be sufficient to account for the results. The extremely hot and dry April of this year is perhaps the most marked meteorological feature of the fruiting period of the plants in question; but it is evident that, for capsules ready for deoperculation in May, the setæ must have been fully developed long before the late spring of this year, and as the most, or one of the most, noticeable deviations from the normal is presented by the seta, the cause must be looked for at some far earlier stage. The setæ of next year's capsules were showing well above the shoots when gathered in early July this summer, and if the plants were in a similar stage of development last July, the suggestion may be hazarded that the extreme heat and drought of that period of 1911 may have been the predisposing cause, followed by an arrest of development which only allowed of maturing late this spring.

It may be mentioned that in addition to the characters at first described, which were common (in varying degrees) to all the capsules, there were additional sporadic abnormalities indicative of disturbance of the ordinary processes of development. One capsule at least had a peristome in which the teeth were greatly extended into long, filiform, nodose tips, resembling the cilia of a *Bryum*; and several had the beak of the operculum abnormally elongated, so as much more than to equal the length of the capsule.

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* Since the above was in type I have received further specimens from Mr. Hurst, gathered on Burridge Heath, in abundant and quite normal fruit of the present year, and still retaining many of the abnormal capsules here described.

I sent specimens of the moss to two or three bryologists, and the variety of opinions expressed is at least a testimony to the unusual nature of the phenomenon! At the same time, it is right to point out that only the more extreme forms were received by these correspondents, who had therefore not the complete material for a conclusion that the later gatherings afforded.

Mr. W. E. Nicholson, to whom I first sent it, pointed out the objections to the "hybrid" theory, and was inclined to see in it an abnormal condition. Dr. Hagen found the spores rather unequal in size, suggesting a hybrid origin, but other characters did not support this, and he wrote that in his opinion it was "a variety of *D. heteromalla* analogous to the var. *callistoma* of *D. varia*." Mrs. Britton replied: "It certainly does seem as if the capsules were more like *D. varia* than *D. heteromalla*, though the plants certainly are the latter and resemble the var. *interruptum*. Mitten had a form much like yours from Surrey, and I have a depauperate form with capsules more *typically* oblique than yours." Finally, Mr. R. S. Williams wrote: "Looks like a case of the plants being so crowded as to prevent best development of fruit. Near either var. *orthophyllum* [? var. *orthocarpum*—the leaves in most cases at least are normally falcate.—H. N. D.] or *interruptum*." I scarcely think that the density of the plants can be the cause, as Mr. Williams suggests, of the want of development of the fruit. For one thing, the setæ of the previous year, and also those at present developing, show, with the same conditions as to density, no variation from the normal. Moreover, I should not consider the plants to be unusually close in their growth. From the little experience I have of North American plants I am inclined to think that *D. heteromalla* does not often attain there quite such a robust development as is very frequent with us, and what would there be considered an unusually dense and strong growth is quite usual here. Still, it is no doubt the case that the more dense and compact forms are those which fruit the least frequently and least abundantly, though I have supposed that this was due rather to the unfavourable conditions under which such plants usually grow than to the direct influence of their compactness. In any case, as I have mentioned above, this scarcely appears to be the cause here. Explained or unexplained, however, it seems sufficiently striking and unusual to be put on record.

I should perhaps have remarked that, though in the more or less erect and symmetrical capsule our plant comes near the var. *orthocarpa* (Hedw.), the character of the seta and other considerations preclude its being placed under that variety.

I may add that I hope to distribute specimens through the Moss Exchange Club this winter.

A NEW BRITISH *RUBUS*.

BY THE REV. W. MOYLE ROGERS, F.L.S.

AN opportunity this year of studying afresh living bushes of the bramble dealt with in this paper has satisfied me that it ought to be described and named, with a view to its taking a distinct place in our list. This has been a growing conviction with me for many years, strengthened by the unanimous opinion of all whom I have consulted, including the late Augustin Ley. Only my great unwillingness to enlarge our list has so long kept me from making the attempt.

The earliest specimens of this bramble seen by me were collected by the late Mr. Beeby in the Witley (Surrey) neighbourhood in 1885. For these Mr. J. G. Baker had suggested the name *R. pallidus*, Dr. Focke's comment on which was, "Not *pallidus*. I suppose it will prove to be a var. of *R. rosaceus*," "or a nearly allied form." It was in 1890, at Witley and Tilford, that the Rev. E. S. Marshall first showed me the living plant (some years before I knew of Mr. Beeby's specimens). We then thought it rosacean, but found ourselves unable to place it under any known form of aggregate *R. rosaceus* Wh. & N. We saw it again in several places in the same neighbourhood in 1894; and in the following year he wrote of it as "the common sand form of *R. rosaceus* in West Surrey." In 1900 I found it abundantly in the Haslemere neighbourhood, and traced it thence by Linchmere and Fernhurst to Rogate at the north-west end of Sussex, and to Liphook and Woolmer Forest, in North Hants. In 1901 Mr. Marshall also sent me specimens from between Graffham and Heyshott, at the north-eastern end of West Sussex. Other Surrey specimens sent to me have been from (1) Milford Common, 1908, L. Cumming; and (2) Queen's Cottage grounds, Kew, 1909, Jackson and Rolfe. I have also seen 1909 specimens collected by Mr. C. E. Britton on Hosey Common, W. Kent; and living bushes which I cannot separate from it on Chinnor Hill, Oxon. As it is chiefly, if not exclusively, at home on coarse sandy and gravelly soils, I gladly accept for it Mr. Marshall's suggestion of the appropriate name *glareosus*, hitherto apparently unused in *Rubus*. I have seen no Continental specimens.

Rubus glareosus, sp. nov. *Stem* long, arcuate-prostrate, *bluntly or acutely angled*, glaucous, dull purplish-red in exposure, *densely or rather densely clothed* with short clustered hairs, irregularly scattered tubercles and unequal but mostly very short stalked glands and pricklets, with an occasional gland-tipped acicle on the faces. *Prickles many*, fairly *strong and subequal, with large compressed bases, almost confined to the angles. Leaves* 3–5-nate-*pedate*; 5-nate ones very few; 3-nate ones with lateral leaflets gibbous or deeply cleft. *Leaflets narrow obovate, opaque* and subglabrous *above*, paler and hairy on the nerves beneath, with petioles armed and clothed like the stem and very prickly petiolules and midribs. *Terminal leaflet* about three times as long as its petiolule; *gradually acuminated into long point* and still more gradually narrowed from above the middle to the *entire subcuneate base*; with acute or acuminate teeth usually all directed forwards, those of the upper ½ or ⅜ of the leaflet as a rule considerably compound, the lower nearly simple. Stipules narrow linear or linear-lanceolate, densely gland-ciliate. *Panicle lax*, pyramidal and subracemose above, or more compound straggling and truncate, *with greater part ultimately ultra-axillary*, the topmost bracts elongate narrow and deeply cleft with one or more ovate simple leaves below them; the lower branches racemose-corymbose, like secondary panicles in strongly developed examples, patent-erect or nearly patent. *Rachis and pedicels* felted and densely hairy, *with very crowded and very unequal* but *mostly sunken dark stalked glands*, an occasional gland-tipped acicle and many rather weak declining or slightly curved prickles but *no slender bristles*. *Sepals attenuate*, externally clothed like the rachis, greenish with narrow white margin, loosely reflexed at first, suberect or clasping as the fruit forms. *Petals* pale pink, narrow, distant, *remarkably attenuate at both ends*. Stamens ultimately pink, soon erect and closing in on the red styles. Carpels more or less hairy.

On sand and gravel in North-east Hants, South-west Surrey, West Sussex, and West Kent; frequent and locally abundant. On chalk, Chinnor Hill, Oxford; a luxuriant form, but I think certainly not distinct from the more eastern type.

When it is placed beside its nearest allies known to us, the most obviously distinctive characters in this bramble are seen in its singular leaves, as described above, and especially as compared with those of *R. rosaceus*, in which the leaflets are conspicuously broad and roundish, with very irregular toothing. The armature of *R. glareosus*, on the other hand, is very like that of *R. rosaceus*; in the panicle especially it is nearly or quite identical. But the stem-prickles of *R. glareosus* are stronger, and nearly confined to the more prominent angles, while the minute pricklets, passing into pointless tubercles, are far more densely packed on the striate faces. It also has a laxer and more ultra-axillary panicle than *rosaceus*, and much narrower petals.

The only other plants in our list which might at first sight be mistaken for *R. glareosus* are my *Purchasianus* and *infecundus* and *R. pallidus* Wh. & N. But *R. pallidus* may without much difficulty be separated from it by its distinctly more radulan armature, its numerous large 5-nate leaves, and conspicuously ovate leaflets less narrowed below their middle to a rounded cordate base, with coarser irregular serration, and its white petals; while *Purchasianus* and *infecundus* differ conspicuously enough in many of their characters.

Thus *infecundus* may be readily recognized by its still deeper and more generally diffused red coloration, its nearly patent long acicular prickles, thick soft yellowish-green and chiefly 5-nate leaves, and large nearly oval terminal leaflet with principal teeth patent or subpatent; together with the more unequal gland-tipped organs of its showy though more frequently barren panicle. *Purchasianus* also looks considerably different from *glareosus*, because of its roundish stem with very crowded nearly patent stout prickles, leaves mostly 5-nate with more uniform outline and toothing, and narrow racemose-cylindrical panicle, with remarkably shaggy rachis, pedicels, and sepals, and very hairy carpels.

A short tabular key may make the arrangement which I propose for these plants plainer :—

A. *Sub-Bellardiani.*

Gland-tipped organs short (on panicle especially), almost wholly sunken.

(1) The large prickles subequal, chiefly confined to angular stem.

R. pallidus Wh. & N. Leaves mostly 5-nate. Leaflets ovate-acuminate, cordate, with coarse irregular serration. Panicle fairly leafy above, with wavy rachis and slender branches. Petals normally white. Carpels glabrous. Widely but thinly distributed in England and Wales.

R. glareosus, sp. nov. Leaves chiefly 3–4-nate. Leaflets narrow, obovate-cuneate with compound serration in the upper half. Ultra-axillary panicle lax. Petals very narrow, pink. Carpels somewhat hairy. North Hants, West Sussex, West Kent, West Surrey, Oxford.

(2) Prickles mostly short, unequal, scattered on roundish stem.

R. rosaceus Wh. & N. Leaves chiefly 3–4-nate. Leaflets broad, roundish, cordate. Panicle leafy almost to the top. Petals broadly obovate or roundish, pink. Carpels glabrous. W. Cornw. to Cumb., with few exceptions; Leic., Derb., and Yorks. M. Perth.

R. Purchasianus Rogers. Leaves chiefly 5-nate. Leaflets rather narrow, obovate-oval. Panicle racemose-cylindrical. Petals narrow, pink. Carpels densely hairy. W. Glos., Monm., Heref., Worc. Perhaps a few counties in the north.

B. *Koehleriani.*

Gland-tipped organs very numerous, of all lengths and all kinds, often far exceeding hairs.

R. hystrix Wh. & N. Stem angular, strongly clothed with very mixed arms. Leaflets obovate-acuminate, thinly pubescent beneath, with distant incised dentate serration. Petals narrow. Fruit abundant. Widely spread in England and Wales. Wigt., Perth.

forma *bercheriensis*. Leaflets nearly oval, with closer, less dentate serration. Berks.

R. infecundus Rogers. Stem bluntly angled, with fewer intermediate arms. Leaflets nearly oval, yellowish, thick, softly hairy beneath, with teeth mostly shallow, though large and nearly patent. Petals soon fading. Fruit often imperfect. W. Cornw. to Lancs. ; Sussex to Derbs. ; Western., Dunb. Though near to *hystrix*, this keeps remarkably distinct.

LINNÆUS'S 'FLORA ANGLICA.'

By James Britten, F.L.S.

In the *Scottish Botanical Review* for July, Mr. Druce has a long paper dealing with this work. As it is mainly through the reprint issued with this Journal for 1909 that the *Flora Anglica* has attracted attention, it may be well to publish here a brief comment on Mr. Druce's paper. This begins with the statement that "recently suggestions have been made to use [it] as a help in fixing the determination of some of the more doubtful plants in the *Species Plantarum*." Mr. Druce does not give any reference in support of this general statement, but a perusal of his paper leads to the conclusion that the cases of *Ulmus campestris* and *Viola canina* were in his mind.

Mr. Druce begins by considering "what the *Flora Anglica* is." It may be conceded that Linnæus had "little or no critical knowledge" of the British flora, and that in identifying the plants in Ray's *Synopsis* ed. 3 he made many mistakes—"most appalling errors," according to Mr. Druce. This, and the fact that Linnæus failed to determine the plants in the "Dubia" which he placed at the end of the list, seem to Mr. Druce "sufficient reason to prevent the *Flora Anglica* being worth serious consideration" and to justify the charge of "unworthiness"; moreover "there are over three hundred plants unidentified or even alluded to by Linnæus."

Taking the last point first, it may be pointed out that the matter which concerns us is not what Linnæus omitted, but what he did. Being a wise man, he confined himself, in the *Flora Anglica* as in his other works, to such identifications as he thought to be correct, leaving aside descriptions as to which he was doubtful. His knowledge of British plants, as has already been said, was not critical, and it is not to be wondered at that he found in Ray's descriptions many to which he could not put a name. Dillenius himself, who was certainly well acquainted with our flora, gives at the end of the *Synopsis* an "indiculus plantarum dubiarum" which contains 196 names (besides a similar list extracted from Lobel) excluded on various grounds from the body of the book, some of which have since been identified. It must also be remembered that many of the "Dubia" of the first edition of the *Flora* were in the *Amœnitates* relegated to their right position in the list (see Journ. Bot. reprint, p. 2), while those that remain are styled "Obscuræ." This shows that Linnæus's knowledge of the British Flora was at least progressive, and possibly less superficial than has been supposed.

Of the three hundred omissions to which Mr. Druce refers, many seem mere forms of the species which precede them; others are critical species which were determined at a much later date. But it is obvious that, even if Mr. Druce's criticism could be maintained, it cannot affect the identifications which Linnæus published.

Among these identifications, Mr. Druce finds "upwards of a hundred wrong, some necessarily trivial, but others of a serious nature"; and he proceeds to give a list of some of these. No doubt Linnæus made mistakes; most of us do, not even excluding Mr. Druce, as the very first example which he gives of Linnæus's shortcomings sufficiently shows. It may be worth while to deal with this somewhat at length on account of the inference which it contains with regard to the use of the *Flora Anglica*, from which Mr. Druce cites a name which he prints as "Salicornia fruticosa" giving as the "modern name" *S. perennis* Mill. On this he has the following note, which I reprint with necessary corrections:—

"This is treated as a variety of *S. europæa* in 'Sp. Pl.' p. 1753 [*recte* p. 3, 1753]. But if the 'Fl. Angl.' is valid, our British plant becomes *Salicornia fruticosa*. In the 2d. ed. 'Sp. Pl.' it is also given as a species, but other synonyms which do not refer to our British species are added [there are *no* additions to the synonymy], and there is no reference to 'Fl. Angl.' or Ray's 'Synopsis.'"

Mr. Druce seems to think that this case corresponds with that of *Ulmus campestris* and *Viola canina*, and apparently gives it as an example of what would happen "if the 'Fl. Angl.' is valid." It seems to me, however, that the supposed difficulty arises from a misunderstanding of the scope of the *Flora*.

There is no reason for supposing that the *Flora Anglica* was intended by Linnæus to represent critical determinations. It was an adaptation of the *Species Plantarum* to the third edition of Ray's *Synopsis*, and the species and varieties of the *Flora* are equivalent to those in the *Species*. The printing of the *Flora* in double columns necessitated the placing of the varietal name under that of the species, thus:

"Salicornia europea herbac. 136–1
fruticos. –2"
"Primula veris officinal. 284–3
elatior –2
acaulis –1"

In the case of *Primula*, as in most of the others, the varieties in ed. 2 of the *Species* bear the same rank, and, as was pointed out in this Journal for 1907 (p. 434) "it is absurd to suppose that Linnæus in 1754 [the date of the *Flora Anglica*] raised to the rank of species plants which a year before he had considered varieties, to which rank he again reduced them in 1762."* In the case of the *Salicornia*, however, Linnæus in 1762 raised the variety of ed. 1 to the rank of a species, but there is not the slightest reason for supposing that this was his intention in the *Flora Anglica*.

Mr. Druce seems to consider this a case analogous to that which has caused the *Flora Anglica* to be cited for the restricted use of *Ulmus campestris* and *Viola canina*,[*] but the cases are in no way parallel. To adopt the name *Salicornia fruticosa* would be to raise a variety to specific rank: with the *Ulmus* and *Viola* there is only a limitation of their application. The definitions in the *Species Plantarum* are admittedly widely comprehensive; and it is clear that Linnæus regarded them as including the British plants described by Ray. This is a distinct limitation of the names, although Linnæus did not himself so intend it, and the names are therefore retained for the British plants—*ex parte* being understood in each case. The alternative to their adoption would seem to be the abandonment of the names altogether as indefinite, but it is generally recognized that such abandonment should only be made in cases of absolute necessity.

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* Mr. Druce quotes this with approval, but writes: "Mr. Britten says (Journ. Bot. Sup. xii. [xlii.] 1909)" etc.; the passage is there given as a quotation from a paper written in collaboration with Dr. Rendle in 1907.

It would be interesting to know on what ground Mr. Druce bases his assertion that *S. fruticosa* L. = *S. perennis* Mill. Dr. Moss, who has paid special attention to the genus, has gone very fully into the matter in the *Report of the Botanical Exchange Club for 1910* (p. 588) and adduces what seems to me conclusive evidence that the *S. fruticosa* of Sp. Pl. ed. 2 is not Miller's *S. perennis*. I quote the following sentence, which it is not easy to understand how Mr. Druce can have overlooked: "It is true that Linnæus in his 'Flo. Angl.' (1754) refers Ray's plant ('Syn.' p. 136, no. 2, 1724) to *S. europæa* var. *fruticosa*; and as Ray's plant is *S. perennis* Mill. (= *S. radicans* Sm.) it might be urged that *S. fruticosa* is therefore a British plant, and that the latter name must supersede *S. perennis* Mill.; but the 'Flora Anglica' of Linnæus cannot be used to supersede an unmistakable diagnosis in the 'Species Plantarum.'" In the face of this clear statement from an expert, I am at a loss to conjecture how Mr. Druce can maintain (as is shown by his use of the word "also") the identity of the var. *fruticosa* of Fl. Angl. with the *S. fruticosa* of Sp. Pl. ed. 2.

I do not propose to examine further Mr. Druce's list of determinations, which do not seem to me to affect the main question at issue. I would however suggest that the preceding remarks have made it clear that they should not be accepted without investigation.

SHORT NOTES.

ERICA CINEREA L.—Mr. T. W. Hazelby, of Ringwood, Hants, has sent me a remarkable form of *Erica cinerea* L. from the immediate neighbourhood of his home. Whilst there can, I think, be no question as to its specific identity, its distinctions are apparent at a glance. The flowers are unusually large, and the corolla is cleft almost to its base; the sepals seem also to depart from the type. The flowers appear in every way perfect. Neither foliage nor flower show any sign of a suggested hybrid origin, so that, whether it is considered a variety, a mutation, or a mere form, it is, perhaps, worthy of a distinctive name. I have deposited the specimen—only one was found—in the National Herbarium; and, as I can find no reference to any similar form, propose to characterize it thus:—ERICA CINEREA L. var. SCHIZOPETALA. Floribus majoribus; corollis profunde quadripartitis; sepalis lineari-acuminatis, atropurpureis, pellucide marginatis. *Ringwood*, in comitatu Hantonensi, *D. Hazelby* invenit et communicavit.—G. S. BOULGER.

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[*] A reference to Mr. Wilmott's paper in Journ. Bot. 1911 (p. 293) will show that the case of *Viola canina* by no means rests entirely on the *Flora Anglica*.

PARNASSIA PALUSTRIS L. var. CONDENSATA (p. 254).—On first reading the article of Messrs. Travis and Wheldon I expected to find their littoral variety of *Parnassia palustris* applicable to a short, tufted form of the plant very common in the Alps, and especially on sandy, gravelly river-beds and on glacier moraines, such as those of the Argentière and Great Aletsch glaciers. But after examining very many specimens from different parts of Switzerland this autumn, and also from different altitudes, it may be worth while recording the fact that I believe the sand-dune *Parnassia* of Lancashire and Cheshire distinct from any form found in the Alps. The height is of little importance, for in the mountains we very often see *Parnassia* from 3–10 cms. only in stature; but in these low, tufted plants the scapes are not so numerous as in *condensata*, nor are they usually so thick. The flowers are usually 2–2·5 cms. in diameter, and rarely 3 cms. The size of the capsule seems to vary little in either British or Alpine specimens. In Alpine examples the bract appears to be always more or less elevated above the leaves, as in the type; and in the specimens examined the lamina of the radical leaves was rather shorter than the petioles, though occasionally as long. *Parnassia palustris* is extremely common and widely spread in Switzerland, and I have found it once or twice as high as 8000 ft. —H. STUART THOMPSON.

EAST GLOUCESTER RECORDS.—A good number of new records for v.-c. 33, East Gloucester, has recently come to hand. Of these the most interesting is *Teucrium Botrys* L. The species was found in large quantity in a native habitat, at a considerable height above the sea. It occurs in a stony field, of the sort frequent in the Cotteswolds. It is in such fields, quite impossible to cultivate and almost useless even for pasture, that some of the most characteristic plants of the Cotteswolds occur, e. g. *Anemone Pulsatilla*, *Thlaspi perfoliatum*, *Senecio integrifolius*, *Orchis ustulata*, &c. A fine plant was sent me, and I hope to be able to distribute a supply through the Botanical Exchange Club. Other new records from v.-c. 33 (received from Mr. A. J. Stephens and Mr. E. M. Day) are *Spergularia marginata* Kittel (Longney, in the var. *glandulosa* Druce), *Aster Tripolium* L. (Longney), *Bidens cernua* L. (Sandhurst), *Senecio viscosus* L. (in various localities, but of doubtful status), *Plantago maritima* L. (Epney), *Chenopodium serotinum* L. (Gloucester; brickfields), *Acorus Calamus* L. (Berkeley Canal), *Scirpus maritimus* L. (Elmore), *Carex Pseudo-*

cyperus L. (Gloucester, abundant), *Glyceria distans* Wahlb. (Framilode), *Lepturus filiformis* Trin. (Framilode).—H. J. Riddelsdell.

Jersey Plants.—In the list of errors, ambiguities, and plants recorded for Jersey on insufficient authority at the end of Lester-Garland's Flora I find *Chenopodium rubrum* L. "Jersey. Prof. La Gasca"; and *Artemisia maritima* L. "Mr. B. Saunders." Both were gathered by me in August last; the former on some waste ground by First Tower Station, and the latter at Gorey and Anne Port. At Gorey also I came across several plants of *Chlora perfoliâta* L., an addition to the island flora. I gave specimens of both to Mr. Picquet, who showed me *Chenopodium rubrum* L. growing in a pot at the back of his premises. On a ramble over the Quenvais to St. Ouens Pond with Mr. J. W. Attenborough, of St. Helier's, he pointed out to me a *Pyrus* on a sandy ridge, which proved to be *P. Achras*. *Euphrasia nemorosa* Pers. is the form I noticed on the Quenvais; *Erythræa Centaurium* L. var. *subcapitata* Corb. (*fide* J. A. Wheldon) occurs sparingly in the same locality.—Samuel Gasking.

Ranunculus ophioglossifolius Vill. (p. 259). — I saw this species near Cheltenham a week later than Mr. Druce, and was surprised to find it in good quantity over a very small area. It covered some two or three square yards, in one big patch, and several smaller ones, with an outlier in less swampy ground. At fifty yards' distance I took it for a mass of *R. sceleratus* L. The locality is the same as that in which it was originally discovered, and not a different one, as Mr. Druce supposes (Journ. Bot. 1912, p. 259). A few days earlier than the occasion recorded in Journ. Bot. 1890, p. 282, it was found by a Cheltenham botanist, but on both sides of the hedge. It is now lost on one side of the hedge—that, namely, there referred to, but it is all one locality. It was in much greater quantity than in previous years. No further trace of the species could I find, though many neighbouring ditches and ponds were searched. A supply was taken for the Botanical Exchange Club without making any impression on the quantity.—H. J. Riddelsdell.

Montia Segregates (p. 230). — *Montia fontana* L. The specimens of this segregate in Hb. Ley are from Mitcheldean Meend, v.-c. 34; Bredwardine and R. Grwyne, v.-c. 36; Pennard Cliffs, v.-c. 41; Aberedw, v.-c. 43; in Hb. Purchas from Forest of Dean, v.-c. 34. *M. lamprosperma* Cham. in the latter herbarium is from Kingussie, v.-c. 96 (coll. J. T. Syme), and Clova, v.-c. 90 (coll. D. Oliver); in Hb. Ley from Capel Curig, v.-c. 49; Talyllyn Lake, v.-c. 42; and (var. *boreo-rivularis* Lindb.) from a ditch at Llwynmadoc, v.-c. 42.—H. J. Riddelsdell.

Utricularia Bremii in England.—Mr. W. H. Pearsell of Dalton-in-Furness has sent me specimens in flower of the above plant. They were gathered in a peat-bog. The flowers are distinctly sulphur-coloured, the spurs "more pronounced" in some, and with the rounded label. Mr. Pearsell remarks: "The distinctive feature according to Dr. Glück is the strongly reflexed lateral sides of the lower lip of the corolla, but my specimens were either nearly flat or reflexed, indifferently. Certainly when I gathered these flowers (out of hundreds) more than one-third of the number were more or less plane. I am under the impression that age or sunlight (or both) is responsible for the difference. My own impression is that on a bright day all will be plane!" But I think Mr. Pearsell misunderstands Dr. Glück, as the latter says distinctly, "Labium inferius semper planum et rotundum." Anyhow the flowers are conclusive, as most of the flowers sent are quite rotundate and unlike any form of *minor* I have seen.—ARTHUR BENNETT.

UTRICULARIA OCHROLEUCA Hartm.—Among the numerous specimens of so-called "*intermedia*" in the herbarium of the Perth Museum, there is one specimen of true *intermedia* gathered by the late A. Sturrock in E. Perth.—ARTHUR BENNETT.

REVIEWS.

The Students' Handbook of British Hepatics. By SYMERS M. MACVICAR. With illustrations by H. G. Jameson. Eastbourne: V. T. Sumfield. London: John Wheldon & Co. 1912. Pp. xxiii and 463; 274 figs. Price 18*s*. 6*d*. net.

THE study of British bryology, after a period of comparative neglect, has of late years become once more attractive to students. In the matter of mosses the way has been made easy by the publication of Mr. H. N. Dixon's excellent *Students' Handbook*, which is already in its second edition. For hepaticologists, however, the way has not been so clear. There has been no such comparatively cheap work which provides authoritative descriptions and accurate drawings of each species. Mr. Pearson's well-known *Hepaticæ of the British Isles* is beyond the reach of the ordinary student. In recent years, too, the study of hepaticology on the Continent has been keener than in our own country. For instance, Schiffner, Warnstorf, K. Müller, Massalongo, Douin, and others, have been actively engaged. And we should probably have failed to keep in touch with the advance made by these foreign workers (such things indeed have happened in the past in regard to cryptogams), had it not been for the lists, papers, and notes published by Mr. Symers M. Macvicar in this Journal and elsewhere. This work Mr. Macvicar has now supplemented by embodying in book form his knowledge, the results of his researches in the field and in literature, and his matured opinions.

His *Students' Handbook of British Hepatics* provides us with a systematic, descriptive and illustrated account of all the hepatics recorded for our islands, preceded by an introduction dealing with the more general topics—morphology, reproduction, &c. The system of classification adopted is mainly that of Schiffner in Engler's *Natürlichen Pflanzenfamilien.* The number of species recognized is two hundred and seventy-four; and these are grouped in seventy-three genera. Simplified keys to the genera and species are provided; and the work of identifying specimens is further facilitated by the use of italics for emphasizing the most important characters in the descriptions, and by the supplementary notes appended to the species.

The book is a companion volume to Mr. Dixon's well-known *Students' Handbook of British Mosses*, with the difference that the illustrations are intercalated with their respective species in the text, and not grouped on plates at the end of the work. These illustrations give for each species the habit, leaf-shape, areolation and other distinctive characters. They are reproduced from drawings by the Rev. H. G. Jameson, whose accurate draughtsmanship has been well known since the publication of his *Illustrated Key to the British Mosses*. It is interesting to note (p. 89) that the key to the Jungermanniaceæ Acrogynæ was arranged by Mr. Jameson.

The descriptions are written on a uniform plan and are evidently based upon a thorough knowledge of the genera and species. The wide grasp which Mr. Macvicar has of the subject is further shown by the illuminating notes appended to all the species and to some of the genera. These provide practically an epitome of all that is known of the species, their affinities, distribution, &c.—all in the clearest language and in an interesting form.

To sum up, British botanists have good reason to congratulate themselves upon possessing in their own language two model handbooks—Mr. Dixon's Mosses and Mr. Macvicar's Hepatics—elaborated by experts on similar lines, with thorough workmanship and in the clearest fashion. Books such as these cannot fail to give a powerful stimulus to the study of their subject. That is what Mr. Dixon's book is doing, and what Mr. Macvicar's will do. And just as Mr. Dixon's has received a hearty welcome in North America and on the Continent, so, too, will Mr. Macvicar's; indeed, the latter may possibly find a still bigger demand, inasmuch as the need of an adequate book on the Hepatics is so pressing.

It is to be regretted that the intercalation of the illustrations in Mr. Macvicar's text has led to the use of a paper with so heavily mineralized a surface. The book is thereby rendered uncomfortably weighty, and would be burdensome if taken into the field. Perhaps in a future edition it may be found possible to substitute a lighter and purer paper, heavily rolled to produce the smooth surface requisite for the illustrations.

A. G.

Die Orchidaceen von Deutsch-Neu-Guinea. Von Dr. Rud. Schlechter. Heft 1–7, 8vo, pp. 1–560. Fedde, Repertorium, Beiheft. Bd. i. Berlin: Wilmersdorf. 1911–12.

Dr. Schlechter's botanical exploration of German New Guinea, or Kaiser Wilhelm's Land, has produced a wonderful harvest so far as Orchids are concerned. His systematic account of this group, which is in course of publication as a Beiheft of Dr. Fedde's Repertorium, and already numbers 560 pages, is still far from complete, and the general portion bearing on questions of geographical distribution, the subdivision of the family, &c., will not appear until the systematic account is finished. Dr. Schlechter is well known as a keen collector and as specially interested in Orchids, and New Guinea was undoubtedly a promising and largely unworked field. But even then the number of novelties is remarkable. The work is an enumeration of all the species known from German New Guinea, but the great majority are here described for the first time. Dr. Schlechter will doubtless give statistics of the total number of genera and species when discussing general relationships in his final Introduction, but some idea of the total number of species may be gained from the account of individual genera. Thus of *Habenaria* there are twenty-two species, eighteen of which are endemic and twelve now described for the first time. There are thirteen species of *Corysanthes*, all of which are new; three each of *Galeola* and *Vanilla*, also all new. The country proved remarkably rich in Liparidinæ; *Microstylis* provides forty-eight species, *Oberonia* fifty-nine, and *Liparis* fifty, and the majority of these are new. There are also several new genera. *Mischobulbum* is established to include some aberrant species of *Tainia* and *Nephelaphyllum*; *Sepalosiphon* is a member of the Glomerinæ near *Giulianettia* Rolfe, which it resembles in habit; and *Cyphochilus* follows *Appendicula* in Podochilineæ The account of the Dendrobiinæ contains some criticism of Dr. Kranzlin's monograph of the group in the *Pflanzenreich*, and the arrangement adopted by Dr. Schlechter differs in important details from that of the monograph. The great genus *Dendrobium* is divided into forty-one sections; heft 7 carries us as far as section 20, and to species no. 138, and as a very large proportion of these are here described for the first time, the additions to the genus are considerable.

A number of valuable critical notes are included in the course of the work, and wherever possible new combinations are introduced. The descriptions of the new species are full, and include measurements of the various organs. Owing to their length and the absence of any emphasis of the different organs some labour is involved in picking out the diagnostic characters. A clavis at the beginning of each genus, or a brief diagnosis at the head of each description, would have added much to the value of the book from the worker's point of view.

A. B. R.

Exkursionsflora von Java. By Dr. S. H. Koorders. Bd. iii. Dikotyledonen (Metachlamydeæ). 8vo, pp. viii, 498; 6 plates, 4 maps, and 19 text-figures. Jena: Fischer. 1912. Price 28 Marks.

The two earlier volumes of Dr. Koorders' flora of Java were noticed in the April number of this Journal (pp. 136–8), and the method of the work was there described. The present volume, which completes the book, is on similar lines to those adopted in vols. i. and ii. It deals with the gamopetalous dicotyledons, and in addition to its own index of generic names includes a general index of the names of families, genera, and species, with their synonyms and native names. There is also a long list of corrections and addenda for the three volumes. The six plates illustrate aspects of vegetation. The four maps are a useful feature. One is a general map of Java, indicating the localities mentioned in the text. The second reproduces Junghuhn's division of the island into four altitudinal regions, while the third illustrates the horizontal distribution of the chief types of vegetation. The last indicates the position of the various forest reserves which Dr. Koorders has explored botanically and charted for future reference.

We congratulate the author on the completion of a much needed working handbook to the flora of an interesting botanical area.

A. B. R.

BOOK-NOTES, NEWS, &c.

William Weekes Fowler, the oldest of Lincolnshire botanists, died on March 7 at Winterton in that county, where he was born on Feb. 27, 1835. He was a scholar of Christ's College, Cambridge, taking his M.A. degree in 1860; he was for forty-seven years Vicar of Liversedge, Yorkshire, and since 1906 Honorary Canon of Wakefield. He was interested in a wide range of subjects, including botany, especially that of his native county, which he thoroughly investigated. So far as I know, he was the first British student of environment, as to which I have notes from him dating back to 1852. His notes on Lincolnshire plants appeared in the *Phytologist* (1857) and in the *Naturalist* (1878–1890), and he contributed to the second edition of *Topographical Botany* (1883). His most remarkable achievement was the discovery, in 1880, of *Selinum Carvifolia* in Lincolnshire, which he was the first to add to the British Flora; an account of the occurrence with a plate from specimens supplied by him will be found in this Journal for 1882 (p. 129, t. 229). When the Yorkshire Naturalists' Union was formed in 1886 he was elected its president. His genial qualities and wide sympathies endeared him to a large circle of friends.—A. W. W.-P.

Messrs. Milner & Co. of Halifax send us a little shilling (net) volume on *Botany*, by Mr. Boulger, which forms one of their "XXth Century Science Series." These "chapters on the study of plants" are simple and elementary but, as might be anticipated, accurate, and sometimes—as in that on "The Beginnings of Botany"—supply information not generally met with in books of the kind. A useful glossary and a brief bibliography are other satisfactory features: the illustrations, however, leave a good deal to be desired.

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BRITISH AND FOREIGN

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ALGOLOGICAL NOTES.—X.–XIII.

By G. S. West, M.A., D.Sc., F.L.S.

(Continued from p. 89.)

X.—Observations upon Two Species of Œdogonium, with some Remarks upon the Origin of the Dwarf Males.

The two following species of *Œdogonium*, both of rare occurrence, have each presented features worthy of special comment.

1. Œdogonium rivulare (Le Cl.) A. Br.; Wittr. Prodr. Monogr. Œdog. 1874, p. 36; Hirn in Acta Soc. Scient. Fennicæ, xxvii. 1900, p. 119, t. 12, f. 66.

Crass. cell. veget. (plant. ♀)	37–39 μ;	altit.	4–6-plo major;
,, ,, ,, (plant. ♂)	29–33 μ;	,,	5–7 ,, ,,
,, oogon.	75–77 μ;	,,	128–137 μ;
,, oospor.	59–67 μ;	,,	67–78 μ;
,, cell. antherid.	24–26 μ;	,,	15–20 μ.

Hab. Sutton Park, Warwickshire.

There has not been a definite instance of the previous occurrence of this species in the British Islands, although it is recorded for "Scotland" in Cooke's Brit. Freshw. Algæ, p. 169. The characters of the Warwickshire plants were typical in every respect, although the oogonia were in all cases solitary, whereas in various European and American specimens they are frequently 2–7-seriate. The wall of the *oogonium* also turned a rich golden-brown during the ripening of the oospore, but this colouration may have been due entirely to local circumstances.

This Alga has been abundant in a small bay in Bracebridge Pool, Sutton Park, attached to, and amongst, the submerged parts of the shoots of *Equisetum limosum*, since 1906, but was propagated only asexually up to the wet summer of 1910, when the sexual organs were developed in abundance. It has also remained sterile from September, 1910, to August, 1912. It produced zoogonidia in immense quantities every year in the month of October. This formation of zoogonidia was sometimes so active that three generations consisting of no more than three cells, two empty zoogonidangia of the first and second generations respectively, and the escaped zoogonidium of the third generation, were frequently observed. (Fig. 1, A.)

2. Œdogonium fonticola Al. Braun in Kütz. Spec. Alg. 1849, p. 368; Wittr. Prodr. Monogr. Œdog. 1874, p. 41; Hirn, *l. c.* p. 313, t. 49, f. 315.

Crass. cell. veget.	22–25 μ;	altit.	⅔–1½-plo major;
,, oogon.	40–45 μ;	,,	44–48 μ;
,, oospor.	38–43 μ;	,,	42–46 μ.

Hab. Henley-in-Arden, Warwickshire. (June, 1910.)

This species occurred on stones in a small stream, and although the specimens were in a state of fructification, I am able to add little to our defective knowledge of the species. Simultaneously with the development of oogonia and oospheres, the filaments were dissociating owing to the formation of immense numbers of apparent zoogonidia. These were in all stages of germination among the fragmenting filaments. The average vegetative cell is very short (scarcely as long as broad), but the cells from which the zoogonidia were being set free were still shorter. All the young plants were much thinner than the filaments on which the oogonia were developed and from which the motile gonidia originated; they were also very short. Hence, it seems probable that large numbers of small male filaments were being rapidly developed during the formation of the oogonia on the female filaments; and should this prove to be the case, then *Œ. fonticola* is a diœcious macrandrous species with very reduced male filaments, exhibiting a condition intermediate between truly diœcious macrandrous species and those with large nannandria.

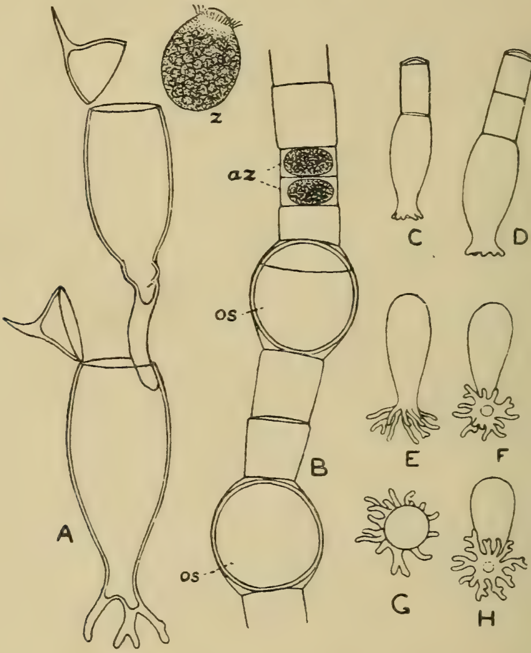

Fig. 1, A.—Three generations of *Œdogonium rivulare*, two unicellular plants and an escaping zoogonidium (*z*). (× 310.) B–H, *Œ. fonticola*. B, female plant with two oogonia containing oospores (*os*), and two androzoogonidangia (*az*) each containing a single immature androzoogonidium; C and D, young male plants which were attached; E–H, developing androzoogonidia which were unattached, showing the much-branched holdfast. × 330.

N. B.—Fig. 1 B represents one of the very few filaments observed with oospores, as in most cases the oogonia were either only just developing or they contained unfertilized oospheres.

Further investigation was unfortunately prevented by the sudden attack of immense numbers of a minute Chytridiaceous fungus, which completed destroyed the *Œdogonium* filaments, the young plants, and the oospores, in rather less than two days.

These observations are of some interest, as they assist in elucidating the problem of the relationships between the macrandrous and nannandrous species of *Œdogonium*. The macrandrous species probably arose from the monœcious species by the physiological differentiation of the zoogonidia, some of which gave rise only to female filaments, and others only to male filaments. There is thus a differentiation of the motile gonidia into *androzoogonidia* and *gynozoogonidia*. In the nannandrous species there is a further differentiation between these two types of zoogonidia in point of view of size, the androzoogonidia being as a rule not more than half the size of the gynozoogonidia, and intermediate between the gynozoogonidium and the antherozoid. All these motile bodies exhibit precisely similar morphological characters. How have the androzoogonidia of the nannandrous species arisen? It is not at all probable that they have arisen from the antherozoids of the monœcious species by an increase in the size of the antherozoid mother-cells, because two antherozoids invarably arise in each cell of the antheridium, by the division of the protoplast, whereas the entire protoplast of the androzoogonidangium forms a single androzoogonidium. Seeing that this is also the case in the formation of both the androzoogonidia and gynozoogonidia of the macrandrous species, and in the gynozoogonidia of the nannandrous species, it is reasonable to suppose that the small androzoogonidium of the latter has arisen merely by a reduction in size, which has gone on hand in hand with a greater sexual differentiation. The specialization has become such, that the androzoogonidia are attracted to the vicinity of the oogonia, and only germinate either on their walls or on the walls of the supporting-cells. The male plant which is then developed is so reduced that there is only one vegetative cell, or sometimes none, and one antheridium consisting of from one to five cells. The reduction of the male filaments to "nannandria" is to be correlated with the fact that the antherozoids are set free in the immediate vicinity of the oogonia, and, therefore, fewer of them are required in order to ensure fertilization. Moreover, vegetative cells are unnecessary except as a support for the single antheridium, and for which one cell easily suffices.

In *Œ. fonticola* the cells of the vegetative filaments (female?) are so short that it is scarcely possible in many cases to distinguish between gynozoogonidangia and androzoogonidangia, and the dimensions of the plants developed from many of the zoogonidia suggest that this species is one in which the full differentiation in size between the androzoogonidia and gynozoogonidia has not yet been attained. It may thus be an *Œdogonium* intermediate, as regards its male filaments, between the truly macrandrous and nannandrous types.

The views expounded above as to the origin of the dwarf males of the nannandrous species of *Œdogonium*, by the reduction and greater specialization of the androzoogonidia of the macrandrous forms, are in agreement with the opinions expressed by Hirn,* concerning the origin of these small male plants. On the other hand, Pascher † states that the nannandrous forms of *Œdogonium* have not arisen from the macrandrous forms. To the best of my judgment the available evidence does not support Pascher's view, which is largely based upon a comparison with the developmental stages of certain of the Chætophoraceæ. Moreover, it must be distinctly remembered that there is not the slightest evidence to show that there is any phylogenetic relationship between the Ulotrichales and the Œdogoniales.

I would suggest the following as the possible evolution of the sexual differentiation in *Œdogonium*:—

DIŒCIOUS NANNANDROUS

Androzoogonidia not more than half the size of gynozoogonidia; male filaments small, greatly specialized, and localized as epiphytes in immediate vicinity of oogonia.

↑

Œ. fonticola (and others?)

Androzoogonidia slightly less than gynozoogonidia; male filaments much reduced in size, but not localized in position.

|

DIŒCIOUS MACRANDROUS

Zoogonidia differentiated into androzoogonidia and gynozoogonidia of practically equal size and morphologically indistinguishable [although male are often slightly thinner than female filaments].

|

MONŒCIOUS SPECIES

Zoogonidia and filaments hermaphrodite in character.

One further point of interest in the development of the zoogonidia was in the nature of the holdfast. The basal cell of the new plant remains of an elongated-pyriform shape, and the holdfast is developed in the usual manner, in this type of development, from the colourless, attached end of the original zoogonidium. In those cases where the young plant had become attached the holdfast was only slightly branched (fig. 1, C and D), whereas in the free-floating young plants, all of which were unicellular, the holdfast had the form of a much-branched disc, the branches being marginal, rather narrow, and blunt at the extremities (*vide* fig. 1, E–H). I know of no other species of *Œdogonium* with a holdfast quite of this nature.

---

* K. Hirn in Acta Soc. Scient. Fennicæ, xxvii. 1900.

† A. Pascher, "Über die Zwergmännchen der Œdogoniaceen." *Hedwigia*, xlvi. 1906.

It will be noticed that both androzoogonidia and gynozoogonidia arise in the large filaments which ultimately develop the oogonia, and it may be inferred from the material that the two types of zoogonidia arise at different periods. There would be obviously no necessity for the formation of gynozoogonidia at the time when the filaments contained oospheres ready for fertilization.

XI.—RESTING-SPORES OF SURIRELLA SPIRALIS Kütz.

In a small boggy area in one part of Sutton Park, Warwickshire, *Surirella spiralis* occurs in a living vegetative state all the year round. The Algæ of this bog have been kept under continuous monthly observation for a period of over five years, and, with one exception, only living cells and empty valves of *Surirella spiralis* have been observed. On January 29th, 1908, one specimen was observed which contained eight spores of approximately equal size, obviously formed by the division of the original protoplast into eight parts (fig. 2). The contents of each spore were oily, very refractive, and of a rich brown colour. In outward shape the spores were rounded-polygonal, and a minute apiculus was present near one or two of the blunt angles of each spore. They were from 20 to 31 μ in diameter.

The spore-walls were strong and thick, having an appearance almost exactly like the edges of the valves, from which one might infer that they were to some extent silicified.

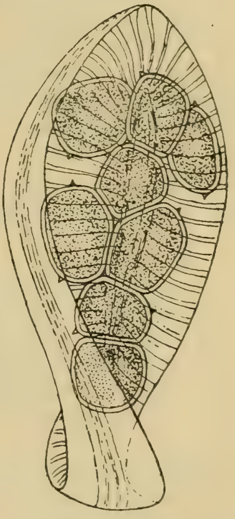

Fig. 2.—*Surirella spiralis*, × 450. Single cell with eight thick-walled resting-spores. The detailed structure of the valve is not indicated.

Thick-walled resting-spores have been seen in very few freshwater species, and only in a few genera of marine plankton Diatoms, but in none of these cases have eight spores been observed within the walls of the original mother-cell. It is in this respect that the spores of *Surirella spiralis* somewhat resemble the gonidia observed by Murray[*] in *Coscinodiscus concinnus* and *Chætoceras borealis*, although in these two marine plankton Diatoms the gonidia were not furnished with thick walls, and were not resting-spores.

A comparison might also be made between the spores of *Surirella spiralis* and the small spores (microspores ?) described and figured by Hustedt* in *Eunotia lunaris*, although again there is no evidence that these were resting-spores.

---

[*] G. Murray, "On the Reproduction of some Marine Diatoms," Proc. Roy. Soc. Edinburgh, xxi. 1897.

On the date mentioned the temperature of the water in the bog, which is fed by a spring, was 3·6° C.

XII.—A New Genus of Volvocaceæ.

Early in the March of this year, Mr. D. J. Scourfield, of Leytonstone, sent me a tube containing large numbers of living specimens of a minute member of the Chlamydomonadeæ. This organism, which is one of the smallest of the Volvocaceæ, has proved of very great interest, and the following genus is proposed for its reception:—

Scourfieldia, gen. nov. Cellulæ vegetativæ minutissimæ, libere natantes et motiles, *valde compressæ*; a fronte visæ plerumque late elliptico-ovatæ vel nonnunquam ellipticæ, polo uno cum incisura minuta et cilios binos perlongos prædito, altero rotundato; a latere visæ anguste oblongæ, lateribus subparallelis et polis rotundatis. Chromatophora singula, viride, subcampanulata sed compressa, sine pyrenoide; nucleo singulo; stigma carente. Propagatio ignota.

S. complanata, sp. nov. (Fig. 3.) Long. cell. 5·2–5·7 μ; lat. cell. 4·4–4·6 μ; crass. 1·8 μ; long. ciliorum 18·5–20 μ.

Hab. In pond on Leyton Flats, Essex (*D. J. Scourfield*; Jan.–April, 1912).

Mr. Scourfield writes that this minute organism "occurred in myriads, the water of the pond being distinctly green without any noticeable alteration in intensity from about the middle of January to the middle of April, 1912. This period included one week of severe frost when the pond was covered with fairly thick ice. The green colour of the water was due entirely to this one organism."

The cells vary in shape very slightly, but are for the most part ovate-elliptic, and the cilia are attached to the base of a minute notch at the narrower pole. The outstanding features of the organism are first, the great compression of the cell; and secondly, the great length of the cilia, which are relatively longer than those of any other member of the Volvocaceæ. The chloroplast is rather thin and bell-shaped, enclosing within its central hollow a rather large amount of the colourless protoplast. There is no pyrenoid, and iodine solution failed to reveal any particles of starch in the specimens examined; in fact, the chloroplast appeared absolutely homogeneous. The nucleus is almost central in position, and in specimens treated with iodine there is a small clear space between the nucleus and the base of the cilia, rather to one side of the median line, which probably represents the position of either one or two contractile vacuoles (fig. 3, A*v*). Between the nucleus and the thick posterior part of the chloroplast are two or three minute but conspicuous granules, the nature of which has not been determined. No pigment-spot (stigma) is present.

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* F. Hustedt, "Beiträge zur Algenflora von Bremen. IV.—Bacillariaceen aus der Wumme," Abh. Nat. Ver. Bremen, xx. 1911.

The movements of this organism deserve special notice. When I received the specimens they were too sluggish to enable me to study their movements properly, but Mr. Scourfield has supplied me with some interesting notes thereon. In normal progression through the water, which is fairly rapid, *the body of the cell is pushed in front by the movements of the cilia which are carried behind*. In other words, *the organism moves backwards* (*vide* fig. 3, E). This is the reverse of the usual method of propulsion in the Chlamydomonadeæ. During progression the body oscillates rapidly from side to side, as indicated in the diagrammatic fig. 3, E. When the organism was at rest the two long cilia were arched backwards, each forming a wide arc. The distal portions of the cilia became anchored to the glass, and the body then swayed about by jerky movements of the cilia. Fig. 3, D, represents this resting position of the organism viewed from the side. It will be noticed that the plane containing the cilia is at right angles to the plane of compression of the cell.

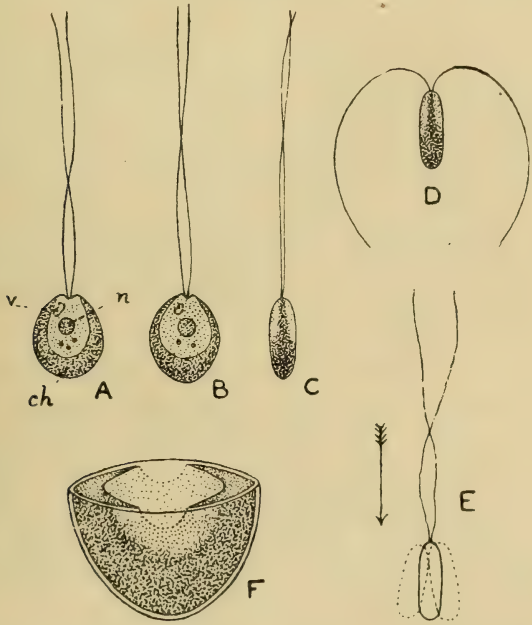

Fig. 3.—*Scourfieldia complanata*. A–C, three individuals stained with iodine; *ch*, chloroplast; *n*, nucleus; *v*, vacuoles (2 ?). A and B, seen from the front; C, side view showing compression of cell. D, side view of individual showing resting position of cilia in living cell. E, diagram to show the direction and the nature of the movements. F, diagram to show cross-section of cell and nature of chloroplast. A–E, × 2000.

The affinities of this organism are quite clear. It belongs to the subfamily Chlamydomonadeæ of the Volvocaceæ. It differs from *Chlamydomonas* (including *Chloromonas**) in the compression of its cells, in the relatively great length of its cilia, and in the nature of its movements.

Another somewhat similar genus of the Chlamydomonadeæ with much compressed cells has recently been described by Pascher † under the name of *Scherffelia*. This genus, like *Carteria*, is furnished with four cilia, but differs from it in its compressed cells, and in the possession of two chloroplasts (sometimes slightly joined at the base). In it Pascher includes two freshwater species, *S. dubia* (Scherffel) Pascher and *S. phacus* Pascher. The genus *Scourfieldia* bears exactly the same relationship to *Chlamydomonas* that *Scherffelia* does to *Carteria*.

Scourfieldia complanata is much less than either of the described species of *Scherffelia*. Apart from the possession of only two cilia, the posterior extremity of the cell is much more rounded, the single chloroplast is of a totally different character, and the cilia are of much greater length.

The transverse section of the cell of *Scourfieldia complanata* is not unlike that of *Scherffelia dubia*, but differs considerably from that of *Scherffelia phacus*. A diagrammatic representation of such a section is given in fig. 3, F.

XIII.—NEW AND INTERESTING BRITISH FRESHWATER ALGÆ.

1. COLEOCHÆTE NITELLARUM Jost in Ber. Deutsch. Bot. Ges. xiii. 1895, p. 433. This Alga occurred abundantly on *Nitella flexuosa* in a small pond at Sutton Coldfield, Warwickshire, in June, 1909. The thinness of the cell-walls has been pointed out by J. F. Lewis,‡ who has also given some details of the sexual organs and fertilization. The first and, I believe, so far the only British record, is by G. Lunam,§ who found the species in the neighbourhood of Glasgow.

2. CHÆTONEMA IRREGULARE Nowak. Diam. cell. 5–8 μ. *Hab.* Doncaster, W. Yorkshire. This rare member of the Chætophoraceæ has not previously been observed in the British Islands. It was growing at the periphery of gelatinous colonies of the Palmella-state of a species of *Chlamydomonas*.

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* N. Wille in *Nyt Magazin for Naturvidenskaberne*, xli. 1903 (Algol. Notizen IX.), regarded the genus *Chloromonas* Gobi as distinct from *Chlamydomonas* Ehrenb., although only differing in the absence of a pyrenoid from the chloroplast. In his revision of the Chlorophyceæ in Engler & Prantl's *Pflanzenfamilien* (1909), however, he no longer regards this separation as justifiable. With this later view I am in complete agreement, as I have repeatedly stated that in the Chlorophyceæ the presence or absence of pyrenoids cannot be considered under any circumstances as of generic importance.

† A. Pascher, "Zur Kenntnis zweier Volvokalen," *Hedwigia*, lii. 1912. In this paper Pascher proposes the new group of the Carteriaceæ to include those members of the Volvocaceæ in which each cell is furnished with four cilia.

‡ J. F. Lewis in Johns Hopkins Univ. Calender, Notes Biol. Lab. March, 1907.

§ G. Lunam in *Glasgow Naturalist*, iii. 1910, p. 26.

3. Gongrosira Schmidlei Richter, Phyc. Univers. no. 630. *Stereococcus Schmidlei* (Richter) Schmidle in Ber. Deutsch. Bot. Ges. xix. 1901, p. 16. Diam. cell. 8–14 (plerumque 9–12) μ; cell. diametro 1½-4-plo longioribus.

Hab. On stones in stream, Randan Woods, Worcestershire; forming a stratum about 1 mm. in thickness, slightly encrusted with lime.

The specimens were collected by Miss E. Acton in June, 1911. The branches are short, mostly unilateral, and, as a rule, the chloroplasts are retained only by the terminal cells (from one to three) of each branch. The parietal chloroplast was large and lobed, containing from one to three pyrenoids. *G. Schmidlei* appears to be a very distinct species, and this is the first time it has been recorded for the British Islands. It should be compared with *G. fastigiata* (Borzi) Schmidle and *G. circinata* (Borzi) Schmidle.

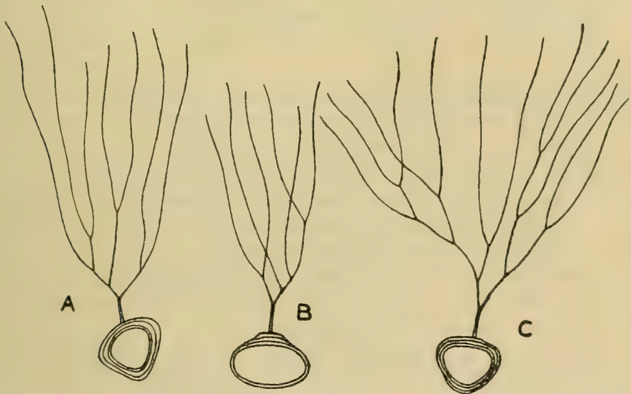

Fig. 4.—*Dicranochæte britannica*, × 500. The cell-contents are not depicted in the drawings.

4. **Dicranochæte britannica,** sp. n. Cellulæ parvæ, depresso-globosæ vel angulari-globosæ, margine ventrali plerumque valde convexo, margine dorsali convexo vel truncato, glabro; membrana firma, subcrassa et lamellosa; ad medium marginis dorsalis vel subdorsalis seta gracillima plus minusve regulariter dichotome ramosa præditæ. Diam. cell. 18–36 (plerumque 19–22) μ; long. set. 60–90 μ. (Fig. 4.)

Hab. In *Sphagnum*-bog, Glyder Fach, N. Wales. (May, 1911.)

This Alga was observed among the leaves of submerged *Sphagnum* in some boggy pools on the southern slopes of Glyder Fach.

Dicranochæte is the only genus of setigerous Green Algæ in which the bristles are branched. The dichotomous nature of this branching is also very characteristic. Up to the present the genus has been monotypic, *D. reniformis* Hieron.* having been originally described from the Sudeten Mountains in Silesia, and since found by Virieux † in France. Lagerheim also records it from near Berlin.

D. britannica is distinguished from *D. reniformis* by the smaller size of the cells, their different external form, the absence of dorsal tubercles, the lamellose character of the cell-wall, and the dorsal attachment of the seta. In *D. reniformis* the cells, when viewed from above, are reniform in shape, the seta arising from the base of the cell and passing upwards through the indentation. In *D. britannica*, on the other hand, there is no lateral groove, and the seta is dorsal or subdorsal in its insertion.

The chloroplast was massive, and its limitations could not be satisfactorily determined from the specimens, all of which were fixed in formalin. No pyrenoid was present, but small grains of starch could be detected. All the specimens observed were free in a sediment obtained by squeezing submerged *Sphagnum*, but there is every reason to suppose that in the living condition they would be attached to the *Sphagnum* leaves.

D. reniformis was obtained by Hieronymus attached to *Sphagnum* leaves, and by Virieux "sur les feuilles des *Hypnum* dans les petites mares de Champlive."

5. SELENASTRUM GRACILE Reinsch. *Hab.* Sutton Park, Warwickshire. (June, 1909.) Somewhat scarce in a small pool among *Scirpus fluitans*. Diam. cell. 2 μ; apic. inter se distantibus 22–24 μ.

6. TETRAËDRON HORRIDUM W. & G. S. West in Journ. Roy. Micr. Soc. 1897, p. 502, t. 7, f. 4, 5.

Hab. In ponds near Nuneaton, Warwickshire. (June, 1908.)

This characteristic species occurred in great abundance along with a few specimens of *Ophiocytium parvulum* (Perty) A. Br.

7. PTEROMONAS ANGULOSA (Carter) Lemm. "Beiträge zur Kenntniss der Planktonalgen V," Ber. Deutsch. Bot. Ges. xviii. 1900, p. 93. *Cryptoglena angulosa* Carter. *Pteromonas alata* Cohn. Long. cell. sine integ. 16·9 μ, cum integ. 22 μ; lat. cell. sine integ. 13 μ, cum integ. 22 μ; crass. cell. 8·2 μ. (Fig. 5, A and B.)

Hab. Earlswood Lakes, Warwickshire. (June, 1912.)

No member of this genus has previously been recorded from the British Islands, possibly because they have been overlooked, but more probably because they are of decidedly rare occurrence. Only a few specimens were seen from the above-mentioned locality.

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* G. Hieronymus communicated his first account of *Dicranochæte* to the *Schlesischen Gesellschaft* on Nov. 10th, 1887; subsequently he published "Ueber *Dicranochæte reniformis* Hieron., eine neue Protococcacea des Süsswassers," Cohn's Beitrage zur Biol. der Pflanzen, v. 1892, pp. 351–372, t. xi, xii.

† M. J. Virieux, "Quelques Algues de Franche-Comté rares ou nouvelles," Bull. Soc. d'Histoire nat. Doubs, no. 21, Avril, 1911, p. 3.

Mr. D. J. Scourfield has sent me a drawing of this species, which he has observed in pools in Essex.

8. Pteromonas Chodati Lemm. *l. c.* p. 94. *P. angulosa* Chodat, 1896. Long. cell. sine integ. 13·5 μ, cum integ. 19 μ; lat. cell. 9·2 μ, cum integ. 21 μ; crass. cell. sine integ. 6 μ, cum integ. 12 μ. (Fig. 5, C and D.)

Hab. In the lakes at Great Barr Park, Staffordshire. (Oct. 1911.)

In this species, as in *Pteromonas angulosa*, the cells are compressed, but the outstanding membrane is of an entirely different character. Quite apart from differences in outward form in the front view (compare figs. 5, A, and 5, C), in the side view there are two large papilla-like protuberances on each side (fig. 5, D). I have only seen a few specimens of this species, and so far have been unable to satisfy myself whether the protuberances so clearly visible in the side view represent ridges extending across the broad sides of the organism, or whether they actually represent two pairs of isolated papillæ on each broad side.

The chloroplast is very similar in both *P. angulosa* and *P. Chodati*, and in each case contains a conspicuous pyrenoid.

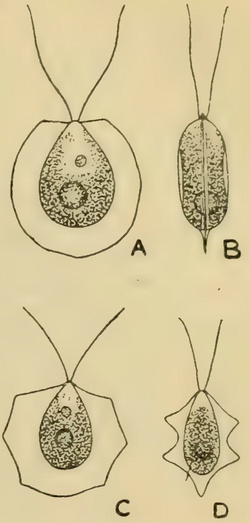

Fig. 5.—A and B, *Pteromonas angulosa*, front and side views; C and D, *P. Chodati*, front and side views. All × 800.

9. Asterocystis halophila (Hansg.) Forti, Syll. Myxophy. 1907, p. 691. *Allogonium halophilum* Hansg. Long. cell. 8–24 (plerumque 11–12) μ; lat. cell. 7–17 (plerumque 11–12) μ; crass. fil. 13–21 μ.

Hab. Epiphytic on the older filaments of *Cladophora crispata* at Studley, Warwickshire. (Nov. 1910; *W. B. Grove.*)

This Alga, which is a typical member of the Chroococcaceæ, has not previously been observed in the British Islands. In his original description Hansgirg mentions the presence of "pyrenoids" 3 μ in diameter, but this must be an error, the "pyrenoid" probably referring to the "central body" of the cell. Hansgirg has also described a var. *stagnalis* of this species (*cf.* Hansg. Prodr. Algenfl. Böhm. ii. p. 132), in which the cells are spherical or spherical-compressed and 5–6 μ in diameter. This variety was described as occurring "in Cladophoris in stagno" in Bohemia.

The habitat of the Warwickshire specimens was exactly that of var. *stagnalis*, but notwithstanding the fact that they were living in perfectly fresh water, they must be referred to the type on account of the size and general proportions of the cells.

SOME HYBRIDS OF THE GENUS *SYMPHYTUM*.

By Cedric Bucknall, Mus. Bac. Oxon.

In this paper I give the results of a study of the hybrids formed by *Symphytum officinale* L. and *S. peregrinum* Ledeb., the latter being the plant which has been long established as a colonist in Britain, as well as in Scandinavia (*S. uplandicum* Nym. p. p.) and in other European countries. I do not now propose to enter into the question of the relations of *S. peregrinum* with *S. asperum* Lepech. (*S. asperrimum* Donn), with which it has so often been confused; let it suffice to say that we have in Britain a plant which agrees with Ledebour's description as distinguished from that of *S. asperum*, and also with the figure and description by Kuznetsoff in his work on the Caucasian species of *Symphytum* (Mem. Acad. Imp. Sci. S. Petersbourg, 1910).

A native of South-east Caucasus and North Persia, *S. peregrinum* appears to have been introduced into Britain (together with *S. asperum*?) at the beginning of last century; it is now widely distributed and likely to spread, as isolated plants are sometimes found at a considerable distance from the main colonies.

In the neighbourhood of Bath and Bristol there are numerous stations for this plant, in some of which it is accompanied by *S. officinale*, with which it hybridizes freely.

As long ago as 1834 Babington gathered *S. asperum* in the Oakford Valley, near Bath, but this, for some reason not fully understood, has disappeared, giving place to the nearly related *S. peregrinum*, which grows there in great profusion, accompanied by *S. officinale*. At the end of May, 1911, when both species were in full bloom, I noticed a few plants which were obviously intermediate between them; a little later I again found both species on the banks of the Land Yeo stream at Flax Bourton, near Bristol, with a considerable number of hybrids, which were easily recognized by the various colours of the flowers. At the end of April of this year, as soon as *S. officinale* was in flower, these localities were again examined, and the hybrid plants were found to be in flower at the same time as that species and earlier than *S. peregrinum*, of which only a few plants were in bloom.

For this reason the hybrids were very conspicuous, and were found to be more abundant than was supposed. Other colonies on the Land Yeo were equally productive of hybrids, several of which, the progeny of different colour-varieties of the parents, were very distinct in appearance and possessed marked characters. In the dried state these forms are, of course, more difficult to distinguish, and in gathering specimens the habit and height of the plant and the colour of the flowers should be carefully noted. As the nutlets of the parent species are very distinct in character, and those of the hybrids mostly intermediate, it is well to gather specimens when the nutlets are fully formed and before all the flowers have fallen. At this stage it will sometimes be found that a few of the latest flowers have reverted to the colour of those of one of the parents—white flowers to the bright blue of *S. peregrinum*, and blue flowers to the yellowish tint of *S. officinale α ochroleucum*. When carefully dried, the white, pale rose or blue flowers of hybrid plants turn to a pale slaty blue, unlike those of *S. officinale α ochroleucum*, which remain white or yellowish; the rose or blue flowers of *S. peregrinum* become a darker and purer blue than those of the hybrids, and those of *S. officinale β purpureum* become dark purple. The important character of the decurrent leaves, though not so conspicuous as in the fresh plant, is sufficiently well shown when it is dry; and the asperous character of the stem and calyx is perhaps more evident than in the fresh state. To show the characters of the stamens and corolla-scales, the corolla may be opened and dried flat.

For the sake of more easy reference I consider it advisable to give appropriate names to the forms which I now describe, and in order to show clearly the characters to be relied on in distinguishing them, I give concise descriptions of the parent species embodying the essential points of difference between them.

S. OFFICINALE L. Plant hispid, sometimes sterile. Stem 2–4 ft. high, rarely asperous except when old, conspicuously winged from node to node; lower leaves elliptic- or ovate-lanceolate, attenuate into the petiole, upper narrowly lanceolate with a broad decurrent base; calyx with acuminate segments, hispid in fruit; corolla white, yellowish, rose, purple, or striped with these colours; anthers longer than filaments; nutlets even or minutely rugulose, faintly areolate, shining, black, not constricted above the broad base.

α ochroleucum DC. Prod. x. p. 37 (1846); Oed. Fl. Dan. t. 664 (1777). *S. bohemicum* Schm. Fl. Boëm. Cent. tertia, p. 13 (1794). Flowers white or yellowish.

β purpureum Pers. Ench. i. p. 161 (1805). *S. patens* Sibth. Fl. Oxon. no. 70 (1794).* Flowers rose or purple.

S. PEREGRINUM Ledeb. Plant hispid and setose, very fertile. Stem 4–7 ft. high, stout, often asperous with tubercular-based setæ, not winged; lower leaves ovate-oblong, cordate, rounded or subattenuate at the base, upper ovate or ovate-lanceolate with narrow base, slightly or not at all decurrent; calyx-segments acute, tubercular-setose in fruit; corolla crimson in bud, then pure blue, or shaded with rose and blue; anthers as long or shorter than filaments; nutlets strongly striate and areolate, closely granulate, brownish-black, constricted above the narrow base.

× S. DISCOLOR mihi. (*S. officinale α ochroleucum* × < *peregrinum*.) Habit and stature of *S. peregrinum*, sparingly fertile or quite sterile. Stem hispid, asperous, narrowly winged; lower leaves rather broadly ovate, upper lanceolate, narrowly decurrent; calyx with acute or acuminate segments, slightly tubercular-setose in fruit; corolla whitish, or more or less tinted with pale rose and blue, turning to pale slaty blue when dry; anthers a little longer than filaments; nutlets intermediate between those of the parents, faintly areolate, dotted with minute scattered points, shining, slightly constricted above the broad base.

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* *S. officinale, when sterile*, has the segments of the calyx spreading after flowering, and it is not improbable that from this circumstance Sibthorp gave the name of *patens* to the "red-flowered comfrey."

Banks of the Land Yeo near Gatcombe Manor, Flax Bourton, and Wraxall; Oakford Valley, near Bath; Warminster Road betweeen Bath and Monkton Combe.

× S. LILACINUM mihi. (*S. officinale* α *ochroleucum* × β *purpureum* × < *peregrinum.*) Habit and stature of *S. peregrinum*, sparingly fertile. Stem asperous, more conspicuously winged than in × *S. discolor*; lower leaves elliptic-lanceolate, rounded or attenuate at the base, narrower as a rule than in × *S. discolor*, upper lanceolate with broader decurrent base; fruiting-calyx setose; corolla purplish with greenish-yellow tip when in bud, then pale purplish-rose, slaty-blue tinged with purple when dry; anthers as long as the filaments; nutlets as in × *S. discolor*.

Bank of the Land Yeo, Wraxall.

My friend Mr. J. W. White, to whom few plant-localities in this district are unknown, conducted me to the secluded and to me unsuspected spot on the banks of the Land Yeo where *S. peregrinum* grew in great luxuriance and perfection. Amongst plants bearing flowers varying from rose-colour to a beautiful blue of the purest tint, the plant described above was conspicuous for the evident admixture which it contained of the two colour-varieties of *S. officinale*, both of which occurred in the neighbourhood. Although it possessed the habit and stature of *S. peregrinum*, the winged stem, derived from *S. officinale*, showed that it was not a mere colour-variety of the former species.

The difference between this plant and × *S. discolor* caused by the additional influence of the var. *purpureum* is very marked in the fresh state, but it must be confessed that the two forms are difficult to separate when dry, the principal characters to be relied on in this case being the generally narrower lower leaves, more gradually attenuated into the petiole, and the slight purple tinge in the slaty-blue of the dried corolla.

× S. DENSIFLORUM mihi. (*S. officinale* β *purpureum* × > *peregrinum.*) Habit of *S. officinale*, but often taller, fertile or sterile. Stem asperous, narrowly winged; lower leaves narrowly oblong-lanceolate, shortly attenuate at the base, upper narrowly lanceolate, conspicuously decurrent; flowers large, open, crowded; calyx with acute segments, hispid, rarely tubercular-setose in fruit; corolla reddish-violet, dark purple when dry; anthers as long or longer than filaments; nutlets as in × *S. discolor*, but often olivaceous-black.

Bank of the Land Yeo, near Gatcombe Manor, and Flax Bourton; Oakford Valley, near Bath.

A group of plants in cultivated ground at Fishponds, near Bristol, must be placed here, although I have not seen either of the parent species in the immediate neighbourhood. The presence of blue as well as purple in the flowers, the subcordate lower leaves, and the granulated nutlets, which are sparingly produced show the influence of *S. peregrinum*, but the lower stature, more completely winged stem, and the purplish tint of the flowers, which are not so large or crowded as in × *S. densiflorum*, show that it approaches still more closely to *S. officinale β purpureum*.

A plant which I believe to be *S. officinale* × <*peregrinum* is described under the name of *S. cœruleum* Petitmengin n. sp. inedit. 1903 (*S. cœruleum* Hort. Angl. ex Steud. ?) by Dr. A. Thellung, as follows*:—"Near *S. officinale* L., from which it is distinguished by the upper leaves being imperfectly decurrent (only to the middle of the internodes), corolla sky-blue (not violaceous or yellowish-white), 3–4 times longer than the calyx (not only twice as long), calyx often divided only to the lower ⅓ (not almost to the base), filaments nearly equal to the anthers (not scarcely more than half their length)."

Dr. Thellung refers to this the figure of *S. peregrinum* (Bot. Mag. t. 6466), and the *S. peregrinum* of Ascherson and Gräbner (Fl. Nordd. Flach. 1878–9, p. 577), which he says are not the plant of Ledebour, but may be the hybrid *S. asperum* × *officinale*. He states that a plant which occurs as a weed in the Botanical Garden at Zurich, as well as one from Sion (F. O. Wolf, cult. ?), is the same as Petitmengin's *S. cœruleum*, which grew at Doumartemont (Meurthe and Moselle), France. As regards Bot. Mag. 6466, it represents, in my opinion, *S. peregrinum*, but if the plants to which Dr. Thellung refers have the stem partially winged, as in *S. cœruleum*, they are doubtless hybrids, of which *S. officinale* is one of the parents; and, as there is no evidence in the description of *S. cœruleum* that it possesses the characters which separate *S. asperum* from *S. peregrinum*, and as the latter probably occurs more frequently than the former on the Continent as well as in Britain, I consider it more likely that *S. peregrinum* rather than *S. asperum* is the other parent.

It being therefore fairly certain that the plant of Petitmengin and Thellung is the hybrid *S. officinale* × *peregrinum*, and that it cannot be included with either of those which I have described, I have little hesitation in referring to it a plant in the Botanic Garden of Bristol University which agrees with Thellung's description as far as it goes, and of which the characters are as follows:—

× S. CŒRULEUM Petitmengin. (*S. officinale α ochroleucum* × *peregrinum*.) Habit and stature of *S. peregrinum*, but almost entirely sterile. Stem hispid, asperous, partially and rather broadly winged; lower leaves oblong, attenuated into the petiole, upper lanceolate, semidecurrent from the rather broad base; calyx with acute segments; corolla rose tipped with green when in bud, then bright blue or rose and blue, the tips of the lobes sometimes yellowish; anthers equal to filaments; nutlets (very seldom produced) closely granulated.

Some plants in the Oakford Valley with shortly decurrent leaves and bright blue flowers resemble this form, but are quite fertile. Other plants with a habit approaching that of *S. officinale* and with bright blue flowers are probably very near to *S. cæruleum*, but have not been seen in fruit.

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* A. Thellung, *Beiträge zur Kenntniss der Schweizerflora* (viii.). Separat, Dec. 14th, 1907, pp. 459–462.

× *S. cæruleum* is the only form of *S. officinale* × *peregrinum* which I have as yet recognized in the herbaria which I have examined, and even that occurs more rarely than might be expected. The specimens which I have seen are labelled as follows:—

"*S. acutum.* In h. Genev. cult. Juin, 1850, Huet de Pavillon." *Conservatoire Botanique, Genève.*

"*S. officinale* v. *patens.* Telford, Surrey, E. S. Marshall." *Herb. Mus. Brit.*

"*S. patens* Sibth.* Aalen, Würtemberg, 1909, Braun." *Herb. C. Bicknell* (Bordighera).

"*S. peregrinum.* Selkirk, July, 1910." *Herb. G. C. Druce.*

While *S. peregrinum* produces fruit abundantly, *S. officinale*, even when growing alone, and without any suspicion of hybridity, is often quite sterile. In the case of the hybrids above described some plants are sterile, while others produce fruit sparingly—never in such abundance as *S. peregrinum.* In the Oakford Valley a careful search in a large patch of × *S. discolor* failed to reveal a single nutlet, while on the Land Yeo the same plant produced them in fair number. In the case of × *S. densiflorum*, one group of plants was completely barren, while others bore a small quantity of well-developed fruit. It is possible that there are other hybrids between *S. officinale* and *S. peregrinum*, which cannot be included with either of those described in this paper. I have, indeed, gathered a single specimen of a form which appears to be nearer to *S. officinale* α *ochroleucum* than any of these, but more material and further observation are necessary before deciding whether this is worthy to be described as a distinct form.

In order to comply with the Vienna Rules, a description in Latin of the new hybrids is appended:—

× S. DISCOLOR mihi. (*S. officinale* α *ochroleucum* × < *peregrinum.*) Planta parce fertilis vel sterilis. Caule 1·5–2 m. alto, ramoso, setis interdum in tuberculis insidentibus aspero; foliis puberulis setosisque, inferioribus ovatis, basi rotundatis in petiolum decurrentibus, superioribus lanceolatis, acuminatis, a basi dilatata decurrentibus; racemis brevibus, post anthesin paulo elongatis; calyce hispido ad tertiam partem inferiorem in laciniis lanceolatis acutis acuminatisve diviso; fructifero subsetoso; corolla tubuloso-infundibuliformi, ventricosa, albida aut colore dilute roseo cœruleove tincta, sicca cæsia, in lobis ovatis apicibus interdum flavidis subreflexis fissa, calycem duplo triplove excedente; fornicibus subulatis obtusiusculis; antheris filamentis paulo longioribus; stylo vix exserto infra apicem inflexo; nuculis inter illas parentium

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* There is no doubt that the name of *patens* has often been applied to *S. peregrinum* and its hybrids. In Journ. Bot. 1900, p. 279, Mr. J. W. White points out that the figure t. 1516 in Eng. Bot. ed. iii. does not represent Sibthorp's *S. patens.* It does, in fact, represent either *S. peregrinum*, or the blue-flowered hybrid, *S. cæruleum.*

intermediis, ovatis, curvatis, oblique carinatis, obsolete areolatis, minutissime sparsimque granulatis supra basin latam leviter constrictis, fusco-nigris, nitidis.

Hab. Ad ripas rivulorum fossarumque et ad margines silvarum prope Bristolliam et Bathoniam in comitatibus Somersetæ et Gloucestriæ.

S. LILACINUM mihi. (*S. officinale* α *ochroleucum* × β *purpureum* × < *peregrinum.*) A × *S. discolori* differt; foliis inferioribus elliptico-lanceolatis, in petiolum attenuatis, superioribus a basi latiori decurrentibus; corollæ gemmis purpureis apice viridibus dein corolla tota dilute purpurea, vel apice loborum flavida.

Ad ripam rivuli "Land Yeo" prope Bristolliam.

× S. DENSIFLORUM mihi. (*S. officinale* β *purpureum* × > *peregrinum.*) A × *S. discolori* differt; habitus *S. officinalis* sed caule sæpe elatiori; foliis inferioribus anguste oblongo-lanceolatis, basi breviter in petiolum attenuatis; floribus majoribus, confertioribus; corollæ rufo-violaceæ limbo latiori; nuculis sæpe olivaceo-nigris.

Hab. In locis iisdem in consortione cum precedentibus.

ALABASTRA DIVERSA.—XXII.

By SPENCER LE M. MOORE, B.Sc., F.L.S.

ASCLEPIADACEÆ AFRICANÆ NOVÆ VEL RARIORES.

Tacazzea amplifolia, sp. nov. Caule volubili sparsim folioso subtereti longitrorsum striato puberulo dein glabro, foliis petiolatis magnis late ovatis breviter cuspidato-acuminatis basi rotundato-cordatis membranaceis utrobique glabris, linea interpetiolari dentibus prominentibus onusta, cymis satis elongatis sed foliis brevioribus crebro ramosis ramis ascendenti-patentibus puberulis, bracteis subulatis quam pedicelli puberuli plane brevioribus, calycis segmentis ovatis obtusis vel obtusissimis pubescentibus, corollæ alte partitæ lobis calycem longe superantibus oblongo-ovatis obtusis glabris, coronæ phyllis columnam stamineam superantibus filamentorum basi adnatis trilobis lobis lateralibus brevibus ovatis obtusissimis lobo intermedio subulato apice integro, filamentis latis.

Hab. Angola; *Gossweiler*, 616.

Caulis 4 mm. diam., cortice dilute brunneo obductus. Folia 13–14 × 8–9 cm., subtus pallidiora necnon perspicuius nervosa; costæ laterales utrinque 5, ascendentes, obscure arcuatæ; petioli leviter torti, basin versus puberuli ceterum glabri, 3 cm. long. vel paullo ultra. Lineæ interpetiolaris dentes subulati, 1·5–3 mm. long. Cymæ circa 7 × 7 cm. Pedunculus validus, puberulus, 2·5 cm. long. Bracteæ 1–2·5 mm., pedicelli ± 5 mm. long. Calycis segmenta 2–2·5 mm. long. Corollæ tubus vix 1 mm. long.; lobi 9 × 5 mm. Coronæ phylla basi 2–3 mm. lat., horum lobi laterales 1 mm. long.; lobus intermedius 5·5 mm. long. Filamenta 2 mm. long., superne 3 mm. lat. Columna staminea 2 mm. long.

To be inserted in the genus close to *T. Barteri* Baill. and *T. Tholloni* Baill. The distinguishing marks are the large cordate-based glabrous leaves, the broad lobes of the corolla, and the coronal leaves with their short lateral lobes.

Tacazzea Oleander, sp. nov. Frutex orgyalis a basi ramosus, ramis ascendentibus subteretibus longitrorsum striatis puberulis mox glabrescentibus crebro foliosis, foliis oppositis suboppositisve brevipetiolatis lanceolatis apice mucronatis basi rotundatis chartaceis supra glabris subtus tomentellis, cymis pluribus paniculatis quam folia brevioribus, pedunculis pedicellisque pubescentibus his floribus longioribus, bracteis parvis subulatis puberulis, calycis pubescentis segmentis deltoideis obtuse acutis, corollæ altissime partitæ lobis calycem certe superantibus oblongis obtusis glabris, coronæ phyllis subulatis acuminatis apice recurvis quam corollæ lobi brevioribus, filamentis quam lobuli intercalati bilobati paullulum longioribus.

Hab. Angola, banks of Cubango River, near Forte Princeza Amelia; *Gossweiler*, 2310.

Foliorum limbus plerumque 7–9·5 cm. long., juxta medium 15–18 mm. lat., supra dilute olivaceus subtus griseolus; reticulum satis arctum, pag. inf. optime eminens; petioli circa 5 mm. long., basi dilatati, pubescentes dorso puberuli. Cymæ pleræque 3–5 cm. long., plurifloræ. Flores cernui. Calycis segmenta 1·5 mm. long. Corolla extus rubro-purpurea; lobi intus luride flavi, 5 mm. long. Coronæ phylla 3 mm. long. Filamenta ·5 mm. long.; lobuli interjecti ·3 mm. long., horum lobi deltoidei, obtusi. Antheræ circa 1 mm. long.

From *T. venosa* Decne. this differs chiefly in the broad-based leaves, the pubescent cymes, the small deltoid segments of the calyx, the narrow petals, and the short coronal leaves.

Raphionacme linearis K. Schum.

Angola, here and there in the marshes of the Kuiriri at Kassuango and near Munonque; *Gossweiler*, 2473, 3434.

Flowers nodding, violet.

R. globosa K. Schum.

Angola, amongst Glumaceæ in the fissures of ferruginous rocks in thickets between Forte Princeza Amelia and the River Cubango; *Gossweiler*, 2275.

This rare species is represented at the British Museum only by a sketch and a couple of flowers from Welwitsch's herbarium.

Raphionacme virgultorum, sp. nov. Caule nunc e rhizomate valido vel tuberoso nunc e caule verisimiliter hornotino radicante erecto spithameo vel paullo ultra striato pubescente superne folioso, foliis vetustioribus oppositis junioribus suboppositis nisi alternis oblanceolatis vel lineari oblanceolatis obtusis basi in petiolum brevissimum angustatis costa media pag. inf. eminente necnon griseo-pubescente exempta puberulis, cymis terminalibus subsessilibus vel breviter pedunculatis plurifloris floribus satis congestis, pedunculis ut pedicelli et bracteæ et calyces pube grisea dense obsitis, bracteis parvulis filiformibus quam pedicelli brevioribus, calycis quam pedicellus sæpe brevioris segmentis lanceolatis obtusiusculis, corollæ fere usque basin partitæ lobis calycem excedentibus oblongo-ovatis obtusis extus pubescentibus basi squamis 2 parvis lanceolatis onustis, coronæ phyllis corollæ ori insertis angustissime lineari-lanceolatis acutis vel emarginatis columnam stamineam superantibus, filamentis basi haud dilatatis antheris sursum conniventibus, stylo conoideo.

Hab. Angola, Kubango, in open thickets near Forte Princeza Amelia; *Gossweiler*, 2267, 4006.

Rhizoma nunc 2 cm. diam., nunc 5–12 mm.; caulis radicans dum adsit circa 2·5 mm. diam., rarissime nodulosus, apice ad 10 mm. dilatatus. Caules floriferi 2 mm. diam.; internodia 2–4 cm. long. Folia 3–4 cm. long., summum 8–10 mm. lat., perpauca summa minora. Cymæ 1·5–2 cm. diam. Pedunculus 5–30 mm. long. Bracteæ circa 1·5 mm. long.; pedicelli ± 3 mm. Calyx 2·5 mm. long. Corolla luride flava lobis apice purpureis; tubus fere 2 mm. long., 5-angularis; lobi 5 × 2·5–3 mm., horum squamæ 1 mm. long. Coronæ phylla verisimiliter incurva, 4 mm. long. Filamenta lorata, ·75 mm. long.; antheræ 1·5 mm.

The affinity of this is with *R. globosa* K. Schum., but among other features its foliage is different, the corolla has but a very short tube, and the coronal leaves are simple. It differs from *R. kubangensis* in the narrower leaves, of which the uppermost are alternate, the congested cymes, the colour of the flowers, the shorter corolla-tube, the lanceolate scales on the corolla-lobes, the short filaments not dilated at the base, and the smaller anthers.

Raphionacme kubangensis, sp. nov. Caulibus e rhizomate crasso sæpius inferne tuberoso erectis simplicibus nisi ramulos perpaucos debiles emittentibus crebro foliosis pubescentibus, foliis obovato-oblongis obtusissimis vel ipso apice brevissime cuspidulatis basin versus in petiolum brevem gradatim angustatis papyraceis utrinque velutino-pubescentibus, cymis terminalibus quam folia brevioribus plurifloris pubescentibus, pedicellis floribus circiter æquilongis bracteas facile superantibus, calycis segmentis ovato-lanceolatis obtuse acutis pubescentibus, corollæ tubo calycem breviter excedente lobis ovato-oblongis obtusis basi dentibus 2 parvulis onustis extus pubescentibus, coronæ phyllis filamentorum basi insertis subulatis erectis apice incurvis antheras breviter excedentibus, filamentis inferne inflatis superne filiformibus.

Hab. Angola, Kubango, between Sobu Calulu and Hungo; *Gossweiler*, 2269.

Herba circa bispithamea. Rhizoma 10 cm. long,; pars tuberosa 5 × 7·5 cm.; collum 4 cm. long., 8 mm. lat., erectum. Caules teretes, in sicco brunnei, longitrorsum striati; internodia 3–6 cm. long. Folia 5–6 × 2–3 cm.; nervi laterales utrinque 10–12, pag. sup. magis aspectabiles; petioli 4–8 mm. long., supra excavati, pubescentes. Cymæ circa 4 × 4 cm.; cymularum pedunculi 1–2·5 cm. long., patentes vel ascendentes. Bracteæ fere 2 mm. long.; pedicelli florum profecto pansorum circa 6 mm. long. Flores virescentes. Calycis segmenta 2 mm. long. Corollæ tubus 2·25 × 2·5 mm.; lobi 4·5 mm. long. Coronæ phylla

3·5 mm. long., deorsum ·5 mm. lat. Filamentorum pars inflata 1 mm. long., pars altera filiformis, 1 mm. long.; antheræ ovoideæ, sursum attenuatæ, stylum brevem longe superantes, 2 mm. long.

Differs from *R. angolensis* N. E. Br. chiefly in the less broad leaves markedly narrowed below, the small flowers with shorter and broader calyx-segments, the much shorter corolla lobes, the filaments filiform in their upper part (not broadly oblong), and the short staminal column.

MICROSTEPHANUS CERNUUS N. E. Br.

German East Africa, between Zanzibar and Uyui; *Rev. W. E. Taylor*. North and south of Mombasa; *A. Whyte*.

One of Whyte's specimens is in fruit, bearing follicles which are ovoid-oblong below, gradually narrowing above to the obtuse apex, nearly 5·5 cm. long, and about 1 cm. broad below and 2-3 mm. close to the top; under the lens they are finely pulverulent-puberulous. The seeds are oblong, shortly beaked, dark brown, and scaberulous, with a 24 mm. long coma.

Asclepias katangensis, sp. nov. Herba summum ultrametralis caule erecto valido subtereti longitrorsum sulcato satis crebro folioso glabro, foliis sessilibus ovato-oblongis obtusis basi cordatis aperte amplexicaulibus membranaceis glabris, umbellis terminalibus nisi ex axillis summis ortis circa 9-floris pedunculis validis facie superiori excavatis glabris quam folia longioribus vel brevioribus fultis, pedicellis alabastra longe excedentibus ascendentibus puberulis, calycis segmentis oblongis obtusis quam corollæ lobi brevioribus, corollæ rotatæ lobis ovatis obtusis retusisve extus fere glabris intus minute papillosis, coronæ phyllis fere usque ad 3 mm. columnæ stamineæ adnatis antheras paullulum superantibus complicatis truncatis intus ecornutis margine terminali argute paucidentata, antherarum alis valde prominentibus appendicibus ovatis brevibus supra stigma concavum breviter inflexis.

Hab. Belgian Congo, Lovoi River, Katanga, November, 1910; *Kassner*, 3353.

Caulis magna pro parte 6–8 mm. diam., sursum usque ad 3 mm. paulatim deminuens, in sicco dilute badius nisi sordide albidus; internodia pleraque 5–7 cm. long. Folia ± 10 × 4 cm.; nervi laterales utrinque circa 10, ascendenti-patentes. Umbellæ circa 6 cm. diam., inferiorum pedunculus 3–3·5 cm. long., superiorum brevior. Pedicelli plerumque 2·5 cm. long. vel paullo longiores. Calycis segmenta 12 × 4 mm. Corollæ lobi 16 × 10 mm. Coronæ phylla 6 mm. long., 5 mm. lat. Columna staminea 8 mm. long.; antherarum alæ 4 mm. long. Pollinia oblongo-pyriformia, 1·8 mm. long.; caudiculæ ·6 mm. glandula ·5 mm. long.

Near *A. semiamplectans* Hiern and *A. glaucophylla* Schlechter, from both of which its flowers serve at once to separate it.

Asclepias munonquensis, sp. nov. Caulibus e rhizomate tuberoso erectis fere omnimodo foliosis hispide pubescentibus, foliis sessilibus ovato-oblongis apice rotundatis ipso mucronatis basi breviter cordatis amplexicaulibusque membranaceis costa centrali hispide pilosa exempta margineque cartilaginea rigide ciliata glabris, umbella (spec. unici nobis obvii) pseudoterminali satis longe pedunculata circa 8-flora pedunculo ut pedicelli quam se ipse breviores pubescente, bracteis pro rata magnis lineari-lanceolatis margine ciliatis, calycis segmentis anguste ovato-oblongis obtusissimis extus microscopice pubescentibus margine ciliolatis, corollæ alte partitæ lobis calycem plane excedentibus ovato-oblongis obtusis glabris reflexis, coronæ ad 1·5 mm. supra basin columnæ stamineæ adnatæ phyllis col. stam. facile superantibus a latere visis obovatis complicatis lateribus dimidio inferiori concretis margine superiori horizontali utrinque lobulis 2 introrsum spectantibus onustis intus edentatis, antherarum alis sat prominulis appendicibus supra stigma concavum inflexis.

Hab. Angola, Munonque, only one specimen seen; *Gossweiler*, 3534.

Rhizoma 5 × 2 cm.; collum modo 1 cm. long. Caulis paullo ultraspithameus; internodia juxta apicem caulis adusque 2·5 cm. long., alibi multo breviora. Folia plerumque 4–5·5 cm. long., 2–3 cm. lat.; costæ laterales plures, in sicco sæpe difficile aspectabiles. Pedunculus 5 cm. long. Bracteæ summum 15 mm. long., pedicelli 25 mm. Flores verisimiliter virescentes. Calycis segmenta 8 mm. long. Corollæ tubus 3 mm. long.; lobi 17 × 10 mm. Coronæ phylla 9 mm. long., a latere visa 7 mm. lat., harum lobuli late deltoidei, acuti, circa 2 × 2·5 mm. Columna staminea 6 mm. long.; antherarum alæ 3·5 mm., appendices 1·5 mm. long. Pollinia ampullæformia, 1·75 mm. long.; caudiculæ 1 mm., glandula ·5 mm. long.

Near *A. glaucophylla* Schlechter, but too different to render details necessary.

A. Swynnertonii S. Moore.

Angola, in meadows near the River Chipumba, and in short thicket-grown pasturage near Kaconda; *Gossweiler*, 3533, 4311.

Hitherto known only from Rhodesia. The follicles are fusiform, shortly beaked at the top and sparsely hairy, 8–10 cm. long, and at most 15 mm. in breadth.

Asclepias praticola, sp. nov. Rhizomate crasso caules paucos erectos bispithameos crebro foliosos glabros emittente, foliis subsessilibus anguste obovato-oblongis (summis oblongis) obtusissimis (summis obtusis) basi leviter cordatis amplexicaulibusque membranaceis glabris margine tenuiter cartilagineis sub apice ciliolatis, umbellis ex axillis summis oriundis pedunculatis circa 5-floris, pedunculis quam folia brevioribus ut pedicelli floribus longiores cito glabris, bracteis linearibus obtusis pilosis, calycis segmentis oblongis obtusis extus microscopice puberulis, corollæ tubo brevi lobis ovatis retusis glabris, coronæ phyllis columnam stamineam facile excedentibus ad 2 mm. supra basin ex columna staminea oriundis a latere visis ovatis complicatis margine superiore ascendente utrinque 2-lobulato (lobulis deltoideis acutis introrsum spectantibus) apice cuspidulatis lateribus triente superiori inter se liberis intus edentatis, antherarum alis prominentibus concavis appendicibus suborbicularibus sursum inflexis.

Hab. Angola, Kuelai, in meadows liable to inundation near the River Chipumba; *Gossweiler*, 3532.

Folia 7–8 cm. long., 2·5–3 cm. lat., juniora vero minora, sc. ± 4·5 × 1·5 cm., in sicco dilute viridia vel brunnea; costæ laterales plures, pag. inf. magis prominulæ; petioli 2 mm. long., crassiusculi. Pedunculus umbellæ infimæ 3·5 cm. long., ceterarum 2 cm. Bracteæ 7–13 mm. long. Pedicelli 3–3·5 cm. long. Calycis segmenta 7 × 2 mm. Corollæ tubus 2 mm. long.; lobi 19 × 12 mm. Coronæ phylla ægre 1 cm. long., a latere permensa 6 mm. lat.; horum lobuli 2 proximales 1 mm. long., 2 distales 1·5 mm. Columna staminea 7 mm. long. Antherarum alæ 3·5 mm. long., appendices 1·5 mm. Pollinia ampullæformia, 1·75 mm. long.; caudiculæ medium versus tortæ, ·75 mm., glandula ·5 mm. long.

The corona is much like that of its near ally, *A. munonquensis*, from which it differs in foliage and as regards several points in its flowers.

The flowers are said in the collector's note to be "dusky velvety brown." This applies probably to the corona only, for the sepals and petals seem to have been greenish or pale greenish purple, and very thin—indeed, almost papery in consistence.

A. LISIANTHOIDES N. E. Br.

Angola, in thicket-grown rocky ground at Capembe, Cubango; *Gossweiler*, 2293.

An extremely rare species, hitherto represented in this country by a sketch only and a couple of flowers at the British Museum, and a sketch and small fragment of a flower, sent from Paris, at Kew. Flowers drooping, reddish green outside, lurid yellow within.

Asclepias xysmalobioides, sp. nov. Circiter spithameus caule ascendente fere a basi folioso pubescente, foliis brevipetiolatis ovatis apice rotundatis ipso subito acutis basi late subcordatis pergamaceis utrinque glabris, umbella (spec. unici visi) solitaria axillari sessili 4-flora, bracteis parvulis subulatis quam pedicelli pubescentes multo brevioribus, calycis segmentis lanceolatis acutis puberulis, corollæ fere basin usque partitæ lobis calycem plane excedentibus ovato-oblongis obtusis haud reflexis glabris, coronæ phyllis columnam stamineam superantibus paullulumque supra basin huic insertis basi complicato-cucullatis ibique utrinque in lobum suborbicularem productis parte distali erecto ligulato obtuso, antherarum loculis infra coronæ phyllorum lobos absconditis harum appendicibus suborbicularibus supra stigma concavum inflexis.

Hab. Angola, Kubango, rare in open thickets near Forte Princeza Amelia; *Gossweiler*, 4009.

Folia 3·5–4 × 2·5–3 cm., in sicco brunnescentia; costæ laterales plures, costæ centrali incrassatæ ad angulum fere rectum insertæ; petioli 4–5 mm. long., pubescentes. Bracteæ 2 mm. long., pedicelli 7–8 mm. Calycis segmenta 5 mm. long., juxta basin 2·25 mm. lat. Corolla verisimiliter rubra vel rubro-violacea; lobi 14 × 6·5 mm. Coronæ phylla intus minutissime papillosa, 8·5 mm. long.; pars complicato-cucullata 2 mm., pars ligulata

6·5 mm. long., illius lobi laterales 2·5 mm. long. Columna staminea 5 mm. long.; antherarum alæ 2 mm. diam. Pollinia oblongo-pyriformia, 1 mm. long ; glandula 1 mm. long., caudiculis æquilonga.

Very distinct from all African species of the genus. The corona in some respects resembles that of *A. Randii* S. Moore, but this is quite unlike in foliage and other characters.

Asclepias extenta, sp. nov. Caule erecto superne compressiusculo sparsim folioso puberulo cito glabro ; foliis omnibus oppositis subsessilibus lineari-oblongis in apicem mucronatam gradatim exeuntibus basi obtusis supra fere glabris subtus scabridis, umbella solitaria terminali 3-flora pedunculo puberulo folia circa æquante insidente, bracteis fugaceis haud visis, pedicellis alabastra certe excedentibus pube grisea obtectis, calycis segmentis ovato-lanceolatis acutis puberulis, corollæ rotatæ lobis calycem longe excedentibus ovato-oblongis obtusis glabris, coronæ phyllis columnæ stamineæ basi insertis eamque magnopere superantibus erectis deorsum cucullatis intus ecornutis lateribus in cornu satis rigido aliquanto decurvo extenuatis parte superiori cucullum excedente lorata facie superiori excavata superne gradatim attenuata ; antherarum alis satis prominulis appendicibus majusculis ovatis supra stigma inflexis.

Hab. Belgian Congo, Sankuru River, October, 1910 ; *Kassner*, 3326.

Planta bispithamea vel paullo ultra. Internodia circa 6–10 cm. long. Folia ± 10 cm. long., 3–6 mm. lat., in sicco dilute virentia ; petioli circa 3 mm. long. Spec. unici nobis obvii pedunculus 13 cm. long. Pedicelli circa 1 cm. long. Flores pansi circa 3 cm. diam. Calycis segmenta 5 mm. long. Corollæ lobi 15 × 6 mm. Coronæ phylla 22 mm. long.; pars cucullata 8 mm. long., juxta medium 3·5 mm. lat., hujus cornua 3·5 mm. long.; pars lorata 14 mm. long., basi 2 mm., medio 1 mm., apicem versus ·4 mm. lat. Columna staminea 7·5 mm. long. Antherarum alæ 4 mm., appendices 3 mm. long. Pollinia oblongo-pyriformia, 2 mm. long.; glandula ·6 mm. caudiculæ ·4 mm. long.

A very distinct species, with a corona much like that of *A. robusta* N. E. Br., but altogether different foliage.

Asclepias cristata, sp. nov. Caulibus e radice fibroso hac atque illac anguste fusiformi-tuberoso erectis simplicibus vel sparsim ramosis fere a basi foliosis pubescentibus, foliis breviter petiolatis linearibus vel anguste lineari-oblongis utrinque obtusis margine revolutis pag. utraque præsertim vero pag. sup. scabridis, umbellis terminalibus vel pseudoterminalibus pedunculis sæpius folia longe excedentibus fultis 2–3-floris, pedunculis (ut bracteæ parvulæ lineares et pedicelli) pubescentibus, calycis segmentis triangulari-lanceolatis acutis dorso pubescentibus, corollæ tubo brevi lobis ovato-oblongis obtusis puberulis patentibus calycem facile superantibus, coronæ phyllis e basi columnæ stamineæ oriundis quam eademque brevioribus cucullatis inflatis margine terminali ascendente denticulato utrinque lobum erectum col. stam. applicatum oblongum dentatum ferente intus pulvino cristato-crinito maxime prominente breviter exserto onustis, antherarum alis abbreviatis maxime prominentibus appendicibus parvis ovatis inflexis.

Hab. Angola, Kubango, in pasturage on red clay soil at Kapembi and near Forte Princeza Amelia; *Gossweiler*, 2288, 4008.

Radicis tubera sæpius 1–2 cm. long., 3–5 mm. lat. Caulis satis tenuis, circa 20–35 cm. alt. Folia pleraque 3·5–5·5 cm. long., 3–5 mm. lat. (marginibus revolutis neglectis circa 2 mm.), in sicco griseo-viridia; petioli 1–2 mm. long. Pedunculi 10–15 cm. long., rarius ± 5 cm.; bracteæ cito deciduæ, 2·5 mm., pedicelli 1·5–2 cm. long. Flores dilutissime violascentes. Calycis segmenta 4 mm. long. Corollæ tubus ægre 2 mm. long.; lobi 7 × 5 mm. Coronæ phyllis 3·5 mm. long., horum lobi 2 mm. long. Columna staminea 4 mm., antherarum alæ vix 2 mm. long. Pollinia triangulari-pyriformia, 1 mm. long.; glandula ·3 mm., caudiculæ ·5 mm. long.

To be inserted in the genus next *A. palustris* Schlechter, which, with broader leaves and several flowers to the umbel, has markedly smaller coronal leaves with very short instead of elongated lateral lobes.

A. FOLIOSA N. E. Br.

Belgian Congo, Lobefu-Lusambo, Kasai District; *Kassner*, 3307.

Asclepias lepida, sp. nov. Planta fere spithamea radice tuberoso-globoso collo brevi satis gracili coronato, caule ascendente tenui inferne nudo griseo-pubescente deinde glabrescente, foliis breviter petiolatis linearibus acutis margine revolutis sparsim strigilloso-pilosis, umbellis ex axillis superioribus oriundis 4-floris pedunculis inferioribus longioribus foliaque æquantibus omnibus (ut pedicelli) gracilibus puberulisque, calycis segmentis anguste lineari-lanceolatis acuminatis puberulis, corollæ alte partitæ lobis anguste ovato-oblongis obtusis calycem paullo excedentibus patentibus glabris, coronæ phyllis columnam stamineam vix æquantibus a basi ejusdem usque ad medium col. stam. adnatis a latere visis ovatis complicatis margine terminali ascendente apicem versus obtusissimum inflexo lobo brevi bidentato col. stam. applicato utrinque prædito intus linea pilorum transversa densa onustis, antherarum alis parum prominentibus appendicibus suborbicularibus supra stigma concavum inflexis.

Hab. Angola, Kubango, in gravelly pasturage near Forte Colui; *Gossweiler*, 2176.

Radicis pars tuberosa 15 × 12 mm.; collum 10 mm. long., 2–3 mm. lat., nodulosum. Folia 3-fere 4 cm. long., 2·5–3 mm. lat., in sicco viridia; costa media subtus optime eminens. Pedunculi 2·5–3·8 cm. long. Bracteæ fugaceæ haud visæ. Pedicelli 12–15 mm. long. Flores dilutissime cærulei. Calycis segmenta 7–8 mm. long. Corollæ lobi 9 × 3·5 mm. Coronæ phylla 4 mm. long., horum lobi 1 mm. long. Columna staminea 4·5 mm. long. Antherarum alæ 1·5 mm., appendices 1 mm. long. Pollinia triangulari-pyriformia, 1·25 mm. long.; glandula ·3 mm., caudiculæ ·5 mm. long.

Near *A. pulchella* N. E. Br., from which it differs in the foliage and in several respects in the flowers.

A. PULCHELLA N. E. Br.

Angola, in short thicket-grown pasturage at Munonque, at Forte Princeza Amelia, and at Kapembe, Kubango; *Gossweiler*, 2387, 2387*a*, 2327, 4127.

The rediscovery of this plant by Mr. Kassner was announced three years ago (Journ. Bot. 1909, p. 219). Mr. Gossweiler had, however, previously gathered it several times, but the opportunity of examining his specimens did not occur until recently.

Asclepias Ameliæ, sp. nov. Radice globoso-tuberoso superne collum brevem suffulciente, caule satis humili a basi ramoso ramis sursum foliosis puberulis, foliis sessilibus lineari-oblongis acutis margine revolutis costa media pag. inf. valde prominente sparsissime pilosa exempta glabris, umbellis paucis corymbosis pedunculatis 4–5-floris, pedunculis ut bracteæ lineares pro rata elongatæ pedicellique piloso-pubescentibus puberulisve, calycis segmentis quam corolla brevioribus lineari-lanceolatis acutis dorso pubescentibus, corollæ alte divisæ lobis oblongo-obovatis apice retusis margine microscopice ciliolatis, coronæ phyllis e basi columnæ stamineæ ortis eidemque inferne adnatis dimidio inf. complicato-cucullatis margine superiori brevi utrinque in lobum ovatum obtusum erectum exeunte intus pulvino transverso perspicuo necnon basin propius lamina transversa lata onustis dimidio sup. erectis oblongo-subquadratis obtusis margine inflexis columnæ stamineæ culmen haud attingentibus, antherarum alis prominentibus appendicibus late ovatis supra stigma subplanum inflexis.

Hab. Angola, in stony thickets between Forte Princeza Amelia and the River Kubango; *Gossweiler*, 2176.

Tuber fere 2 cm. diam., radicis pars inf. 6 cm. long., 1·5–2·5 cm. diam.; collum 12 × 4 mm. Caulis vix 10 cm. alt. Folia 1·5–3·5 cm. long., ± 4 mm. lat., in sicco griseo-viridia. Pedunculi longiores 1–1·5 cm., breviores ± 7 mm. long.; bracteæ usque ad 6 mm. long., pedicelli circa 4 mm. Flores dilutissime violacei. Calycis segmenta 5 mm. long. Corollæ lobi 7 × 3 mm. Coronæ phylla 3·5 mm. long.; pars cucullata 1·75 mm., pars terminalis 1·75 mm. long., hæc juxta basin 1·5 mm. lat. Columna staminea ægre 4·5 mm. long. Antherarum alæ fere 2 mm. long. Pollinia triangulari-pyriformia, 1 mm. long.; glandula minuta, circa ·2 mm., caudiculæ ·4 mm. long.

The chief floral difference between this and *A. modesta* N. E. Br. resides in the smaller coronal leaves of the plant described above, united to the staminal column below, and provided with a prominent transverse lamina below the pulvinus, a structure of which the coronal leaves of *A. modesta* show no trace.

Asclepias radiata, sp. nov. Caule spithameo subsimplici tenui ascendente distanter folioso sparsim pubescente, foliis sessilibus linearibus acutis margine revolutis sparsim pubescentibus, umbellis paucis (spec. unici mihi obvii 2) corymbosis 4-floris, pedunculis pedicellisque gracilibus ut bracteæ lineares sparsim

pubescentibus, calycis segmentis lineari-lanceolatis acutis pubescentibus, corollæ alte partitæ lobis calycem excedentibus ovatis obtusis dorso sparsim puberulis, coronæ phyllis columnam stamineam bene superantibus paullulumque supra basin ex eadem oriundis inferne complicato-cucullatis intus glabris margine utrinque dente brevi introrsum spectante prædito superne in laminam sat elongatam anguste lineari-lanceolatam acutam margine involutam radiantem excurrentibus, antherarum alis prominentibus appendicibus parvulis inflexis.

Hab. Angola, in meadows on banks of the Kubango near Forte Princeza Amelia; *Gossweiler*, with 4210.

Folia infima circa 13 mm. long., reliqua 3–5 cm., marginibus revolutis exclusis 1 mm. lat., in sicco cauli subparallelia, rigidiuscula. Pedunculus inferior 5 cm. long., superior 3 cm. Bracteæ circa 2 mm., pedicelli 13 mm. long. Calycis segmenta 2·5 mm. long. Corollæ lobi 4 × 2 mm. Coronæ phyllorum pars cucullata vix 1·5 mm. long., pars radians 2·5 mm. Columna staminea 1·5 mm. long. Antherarum alæ 1 mm. long.; appendices modo ·3 mm. Pollinia triangulari-pyriformia, ·75 mm. long.; glandula caudiculis æquilonga, ·25 mm. long.

To be placed next *A. Randii* S. Moore, which, with a somewhat similar corona, is in several respects different.

Asclepias subviridis, sp. nov. Planta humilis radice fusiformi in collum breviorem satis validum exeunte, caule ascendente fere a basi ramoso ramis gracilibus omnimodo foliosis pubescentibus, foliis sessilibus linearibus acutis margine revolutis sparsim pubescentibus, umbellis paucis corymbosis 2–4-floris, pedunculis ut pedicelli et bracteæ parvulæ lineares sparsim pubescentibus, calycis segmentis lanceolatis acutis pubescentibus quam corolla brevioribus, corollæ alte partitæ lobis patentibus ovatis obtusiusculis extus puberulis, coronæ phyllis columnam stamineam magnopere superantibus ex ejusdem basi oriundis inferne complicato-cucullatis margine terminali utrinque dente brevi ascendente prædito intus dense pubescentibus superne in laminam satis longam erectam oblongam obtusissimam margine involutam intus carinatam exeunte, antherarum alis mediocriter prominentibus appendicibus brevibus leviter inflexis.

Hab. Angola, Cunona-Kutato; *Gossweiler*, 3484.

Radix 6·5 × 1·5 cm., addito collo 15 × 6 mm. Caulis circa 10 cm. alt., hujus rami ascendenti-patentes. Folia pleraque 4–6 cm. long., margine revoluto prætermisso 1–1·5 mm. lat., in sicco griseo-viridia. Pedunculi longiores summum 22 mm. long., superiores ± 10 mm. Bracteæ 2–4 mm. long., pedicelli sæpius 7–14 mm. Flores subvirides. Calycis segmenta 2·5 mm. long. Corollæ lobi 4·5 × 3 mm. Coronæ phyllarum pars cucullata 1·75 mm. long.; pars terminalis 3 mm. long., 1 mm. lat. Columna staminea 2·25 mm. long., antherarum alæ 1·5 mm. Pollinia subrhombica, ·65 mm. long., glandula (ut caudiculæ) ·3 mm. long.

Near the last, but essentially diverse in corona and other floral details.

(To be continued.)

ALLAN OCTAVIAN HUME, C.B.

(1829–1912.)

In the course of a long and busy life Allan Octavian Hume played many parts. The best years of his life were devoted to administration under the Indian Government—in his early days he helped in the suppression of the Mutiny—but he found time to make an invaluable collection of the birds of India, which he presented many years ago to the British Museum. Unfortunately the manuscript of this work, for which the collection was the basis, was destroyed. The son of a politician—Joseph Hume, an ardent reformer—Hume was himself deeply interested in politics, especially relating to India, and the Indian National Congress Movement was the outcome of his enthusiasm for reform. After his return to England in 1890 he became President of the Dulwich Liberal and Radical Association, and held the office until his death a few weeks ago.

Hume's interest in botany, at any rate as an active worker, was comparatively recent. His introduction to the Department of Botany was as a co-worker at the plants of Cornwall with Mr. F. H. Davey, about twelve years ago. Later he was a frequent and perhaps not always a welcome visitor in connection with his *penchant* for collecting aliens. He would bring all sorts of things from all sorts of places, naturally with the idea of finding names for them; and it was impossible to convince him that chance specimens of annuals sent from a piece of waste ground in or near a dock, which would die down at the end of the season and probably never appear again, were not necessarily of botanical interest. Hume's motive was, however, a praiseworthy one. He was busily engaged in getting together a collection of British plants which was to form the nucleus of an Institute for the advancement of the study of Botany in South London. To this he added a generous endowment of more than £10,000, and about a year before his death had the satisfaction of seeing the collection established in a good substantial house in the Norwood Road, under the superintendence of his curator Mr. W. H. Griffin, an enthusiastic student of British botany. A feature of the collection is the large number of seedlings, the majority grown for the purpose by Mr. Griffin, for which the garden attached to the Institute affords facilities. In addition to the plants collected by Mr. Hume himself the herbarium contains the late Mr. Townsend's valuable collection of British and European plants, and also the late W. H. Beeby's herbarium, which was especially rich in plants of the Shetland Islands. Altogether it contains more than forty thousand specimens, beautifully dried and mounted. There is also an admirable working library. During his lifetime Hume invited several botanists to act with him as trustees of the endowment, and these, with some well-known workers in British botany, form the committee of management. By the terms of Hume's will the Institute will ultimately benefit still further.

Hume was much impressed with the study of botany as a relaxation from business and a means of mental culture, and the committee of management are hopeful that the Institute may do useful work in the advancement of that study, especially as relating to the plants of our own country.

Beyond three short notes in this Journal for 1901 and 1902, Hume did not contribute to botanical literature. He is mentioned by Mr. F. H. Davey in the *Flora of Cornwall* (1909) as "my companion on many an excursion in Cornwall and Devon, and from the first my greatest helper in the compilation of this Flora." He became a Fellow of the Linnean Society in 1901.

A. B. R.

SHORT NOTES.

Papaver Rhœas var. chelidonioides O. Kuntze.—Visiting Gedney, Lincolnshire, during the end of July, 1911, I noticed a plant with all the characters of *P. Rhœas*, but containing a deep yellow sap, in colour and abundance exactly comparable with that of *Chelidonium majus*. I forwarded specimens to the Rev. A. W. Woodruffe-Peacock, who subsequently published it in the additions to his "Check List of Lincolnshire Plants for 1911" (in Lincolnshire Naturalists' Union *Transactions*, 1911, p. 295) as "P. Rhœas L. v. Reynoldsii, mihi, 1911, *Reynolds* (with yellow sap)." I again visited Gedney last August in the company of Mr. Burchnal, of Butterwick, Boston, a well-known Lincolnshire botanist, where we decapitated some hundreds of *P. Rhœas*, but not till we reached the exact spot where I had previously found it could we find any with yellow sap. At this place, on the site of a road-mending heap of granite, we found one plant identical with that I gathered there the previous year. It had been a robust plant, but only secondary shoots remained with buds and capsules but no expanded flower. It was growing with an abundance of true *Rhœas*, and we found no character except the sap by which we could separate them. The plant is mentioned by Otto Kuntze (*Taschen-Flora von Leipzic*, 171 (1867)) as *P. Rhœas* var. *chelidonioides*, found only in gardens; the only character, "Milchsaft gelb." Mr. Peacock suggests that the plant may be the hybrid *P. Rhœas* × *Lecoqii*, but my knowledge of the Gedney plant does not encourage this view. The sap of *P. Lecoqii* turns bright yellow about fifteen seconds after exposure to the air; that of the Gedney plant is *at once* deep yellow, and I see by the Lincolnshire Check List that *P. Lecoqii* has not yet been recorded for the south division of the county. I think the variety may have been introduced with the granite.—Bernard Reynolds.

Nitella gracilis in West Cornwall.—In August of the present year we received from Mr. F. Rilstone fresh specimens of this beautiful and extremely rare species which had been collected by him in a ditch near Perranzabuloe. Mr. Rilstone's discovery is of especial interest, as *N. gracilis* has not, so far as we are aware, been found in England for many years past. The species was originally described by Sir J. E. Smith, and figured by Sowerby in *English Botany* (E. B. 2140 (1810)), from specimens collected by Borrer in 1809, in a boggy pool in St. Leonard's Forest, Sussex, but as far as we know it has not been found there since Borrer's time. In 1883 Mr. Arthur Bennett, to whom we are indebted for much valuable material, sent us some fresh specimens of the plant, collected by Mr. W. E. Beckwith in a small deep pool in Shropshire in the autumn of that year. In Ireland it was collected near Ballybetagh, Glen Cullen, Co. Dublin, by Mr. D. Orr, and in 1892, in company with Mr. R. M. Barrington, we found it growing in great profusion in two of the lakes in the Wicklow Mountains, Lough Luggala and Lough Dan. These four are the only authenticated records we have for *N. gracilis* in the British Isles. It is widely distributed in Europe, and occurs in Asia, Africa, and North and South America.—H. & J. GROVES.

TWO GENERA NEW TO TROPICAL AFRICA.—Among specimens sent by Mr. Fred Eyles from Mazoe, Rhodesia, are representatives of two South African genera which have not hitherto been recorded from Tropical Africa. One is the remarkable monotypic genus *Bowiea*, hitherto recorded from the Cape region, and as far north as the Transvaal. Mr. Eyles's specimens, which agree with *B. volubilis*, were collected at Mazoe at 4300 ft. (no. 556) and 4400 ft. (no. 364), the latter climbing under the shade of trees on an isolated granite hill, and growing from a "large flattened round white bulb 3 in. in diameter and 1½ in. deep." The plant is described as bright green, withering yellow, with capsules of the same green as the branches. It was found in flower in January, and in fruit in April. The other genus is *Testudinaria*, represented by *T. sylvatica* Benth., male flowering specimens of which were found in a river-bed at 4300 ft. in December (no. 212). The plant, also male in flower, has since been sent by Mr. E. C. Chubb from Bulawayo. The species is widely distributed in South Africa, and is recorded as far north as the Transvaal—we have a specimen from Johannesburg, from Dr. Rand (no. 1059); others are from Lydenburg, from Dr. Wilms (no. 1496), distributed as *Dioscorea Elephantopus*, and from Houtbosh, from Rehmann (no. 5783).—A. B. RENDLE.

PARNASSIA PALUSTRIS L. var. CONDENSATA (pp. 254, 315).—I have looked in all the floras of the coastal islands from Denmark to France, and the coast floras, but can find no note of the *Parnassia* described by Messrs. Travis and Wheldon. But their limitation of 1–3 scapes to the type can hardly be accepted; in specimens from Chippenham Moor, Cambs, they are from 5–7, and 36 cm. high. These may be contrasted with others from "Sands at Spiggie, Dunrossness, Shetland" (W. H. Beeby), which have 1–2 scapes, and are 5·60 cm. high. Others from "Largo Links, Fife, 9, 1877, J. T. Syme," are 9·23 cm. high, and have 16 scapes, and thus appear approximate to *condensata*; but on careful examination it can be seen that these 16 scapes proceed from a three-headed rootstock, which gives about five to each head.—A. BENNETT.

East Gloucester Records (p. 315).—I have just received specimens of the following from Mr. H. H. Knight: they supply new records (I believe) for v.-c. 33. *Viola canina* L., *Ulex Gallii* Planch., *Erica Tetralix* L., *Juncus squarrosus* L., *Potamogeton polygonifolius* Pourr., *Nardus stricta* L.; all from Lower Lemington, in a wet moory field on the Cotteswolds, near Moreton-in-the Marsh. Also *Glyceria distans* Wahlb. from a rubbish-heap near Cheltenham (introduced). Moreover, the following plants, rare in v.-c. 33, have been sent from new localities:—*Cratægus Oxyacantha* L. (Lemington), *Peplis Portula* L. (Lemington), *Valerianella carinata* Lois (Alderton Hill), *Luzula multiflora* DC., (Lemington).—H. J. Riddelsdell.

Lobelia urens L.—In company with the President of the Cotteswold Club (the Rev. Walter Butt) and two other members, I saw this species growing near the old locality, close to Axminster, in July last. It occupied a considerable area, some hundreds of yards long, but only a few yards wide, in great quantity. As we gathered it, it forms a large luxuriant plant, profusely branching, and easily reaching twenty-seven inches in the early stages of flowering. It overtopped all the surrounding herbage: there were no shrubs immediately around it. Its habit was to grow in clumps about a foot across. Locally it is called "the Flower of the Axe." The area covered by it had, we gathered, been recently reduced by grazing.—H. J. Riddelsdell.

Cynoglossum montanum L.—In the herbarium of the Rev. A. Ley is a specimen of *Cynoglossum montanum* L. from Herefordshire, gathered by Mr. Ley himself. It constitutes a first record for v.-c. 36. Mr. Ley had some doubt of its identity and did not record it; but it is correctly named as above. There is also in the same herbarium a specimen of *Scrophularia nodosa* L. var. *bracteata* Druce, from Bicknor Woods, v.-c. 34, West Glos.; and in Hb. W. H. Purchas the same form from near Ross, v.-c. 36.—H. J. Riddelsdell.

Boston Dock Aliens.—During a recent visit to Mr. S. J. Hurst at Boston we visited the waste ground about the dock and noted the following casuals:—*Sisymbrium Columnæ*; *Alyssum incanum*; *Cicer arietinum*; *Trigonella cærulea*; *Falcaria Rivini*; *Anacyclus radiatus*; *Centauria solstitialis*; *Echinospermum Lappula*; *Plantago Lagopus*; *Setaria glauca*; *Hordeum hexastichon*.—Bernard Reynolds.

Medicago tribuloides Desv.—I have received from Mr. Guermonprez, of Bognor, specimens of *Medicago tribuloides*, which he found growing close to *Trifolium stellatum* at Shoreham this year. It is in some quantity, and has evidently been overlooked by the numerous botanists who must have visited the spot. It could easily be passed as *M. maculata* or *M. denticulata*, both of which are found here.—Bernard Reynolds.

Orchis hircina in Kent (p. 259).—This comes up every year in the neighbourhood of one of the old stations, in varying numbers (one year ten specimens were counted); but is very erratic as to the part of the field in which it appears. I need hardly say that strict watch is kept over it, and the owners will not allow it to be gathered.—ARTHUR BENNETT.

ARENARIA LEPTOCLADOS var. VISCIDULA Rouy & Fouc.—I have lately found this plant at Gwbert-on-Sea, Cardiganshire. It was named for me by Mr. Hiern.—A. WOOD MORRIS.

PRUNELLA LACINIATA IN HANTS.—In the *Selborne Magazine* for April Mr. F. A. Reddie writes from Brockenhurst that he has found there both cream-coloured and purple varieties of *Prunella laciniata*, the naming being confirmed at the National Herbarium. He also records *Neottia Nidus-avis* and *Sparassis laminosa*.

REVIEW.

Pflanzengeographische Monographie des Berninagebietes. By DR. E. RÜBEL. (Reprinted from the *Botanische Jahrbuch*, vol. xlvii. pp. 615, with an ecological map, coloured frontispiece, fifty-eight whole-page plates of vegetation, and twenty figures in the text.) Leipzig: Wilhelm Egelmann. 1912. Price 8 marks.

THIS is an excellent example of those intensive studies of the flora of a small area that we owe to the ecological standpoint of the present century. The many visitors to Pontresina and its neighbourhood may well be glad of a guide to its plants; but this somewhat bulky and weighty volume is far more than the average tourists' flora. The third and concluding part of the work (pp. 297–545) is occupied by a flora, in which Dr. Rübel has secured the assistance of Dr. Herzog for the Mosses, Professor Lindau for Lichens, Dr. Volkart for Fungi, and Dr. G. Huber for Plankton. A special feature of this section is that most species are individually referred to the various constituent elements of the flora. The first part, however (pp. 4–86), contains a detailed discussion of the local ecological factors, in three chapters, dealing respectively with the geography, climate and geology of the region, the last being by Dr. Blösch; and the second (pp. 86–296) treats of the vegetation under its various types, formations, and associations, separate sections being devoted to forest, underwood, upland, grassland, moorland, freshwater, and rock floras, the influence of soil receiving full treatment under the last head. The vertical distribution and the geographical origin of the various elements of the flora are here discussed. Each of these sections of the work is thoroughly equipped with all necessary tables and curves. The large-scale folding contoured map, in which, by a judicious use of various forms of coloured shading, some twenty different "tints" are obtained, separating, for example, tall *Pinus montana* from the stunted form of the same species, and indicating by a special colour the "Curvuletum" or Association of *Carex curvula*, is alone worth almost the whole of the very small price asked for the volume. Some of the illustrations of one or two species in their natural surroundings are excellent; but we fail to see much value in landscapes in which the species are quite indistinguishable, and studies of rock, glacier, and snow without vegetation, however characteristic of the region, seem out of place in a botanical work. The coloured frontispiece, in which thirteen species, named on the tissue-paper fly-leaf, are represented with considerable clearness in their natural environment, is not photographic and is somewhat crude in colour. It would not be a difficult task to reduce this valuable and original work, by judicious abridgement and the omission of unnecessary illustrations and much tabular matter, within the compass of a pocket Flora.

G. S. Boulger.

BOOK-NOTES, NEWS, &c.

The *Transactions* of the Lincolnshire Naturalists' Union for 1911 (Goulding, Louth, 1912) contains a list by Mr. Woodruffe Peacock of "additions and corrections to the Check List of Lincolnshire Plants, 1909," which was noticed in this Journal for 1910 (p. 166), bringing the information "up to the end of the season 1911." It naturally corresponds in style with the List and is therefore alphabetically arranged under genera; the date and authority for the occurrence of each species is given, and the districts are indicated by numbers; we regret, however, that the Union has not published the key to these, which can only be ascertained, as we pointed out in our former notice, from a map issued independently by another publisher. The plant which forms the subject of a note on p. 348 is recorded as "*Papaver Rhœas* L. var. *Reynoldsii*, mihi, 1911, Reynolds [With yellow sap.]": it is to be regretted that new names should be published exclusively in out-of-the-way periodicals.

The Scottish Botanical Review for July contains, in addition to Mr. Druce's paper noticed on p. 312, a list of Caithness Lichens by the Rev. D. Lilley; a description of a new *Pyrenochæta* (*P. Ilicis* from Wimbledon) by Dr. Malcolm Wilson and of a new *Agathosma* (*A. trichocarpa*) by Mr. E. M. Holmes, as well as other papers, none of which, save some notes on Caithness seed-plants by Mr. Arthur Bennett, have any direct connection with Scottish botany.

The last issue (Sept. 24) of the *Journal of the Linnean Society* (Botany) contains papers "On the Structure of the Palæozoic Seed *Lagenostoma ovoides*" by Mr. T. L. Prankerd, and "On the Iternodes of *Calamites*" by Prof. Percy Groom.

The first meeting of the Linnean Society will be held on Nov. 7, when a paper by Dr. R. R. Gates "On Mutating Œnotheras" will be read and Mr. Ridley will exhibit plants from Mount Menuang Gasing, Selangor.

Mrs. E. S. Gregory's monograph of the *British Violets* of the *Nominium* section has been published; we hope to notice it in an early issue.

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DECEASED BRITISH & IRISH BOTANISTS.

BY

JAMES BRITTEN, K.S.G., F.L.S., & G. S. BOULGER, F.L.S.

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EDITED BY

JAMES BRITTEN, K.S.G., F.L.S.

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THE
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BRITISH AND FOREIGN

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JAMES BRITTEN, K.S.G., F.L.S.

The Journal of Botany was established in 1863 by Dr. Seemann. In 1872 the editorship was assumed by Dr. Henry Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

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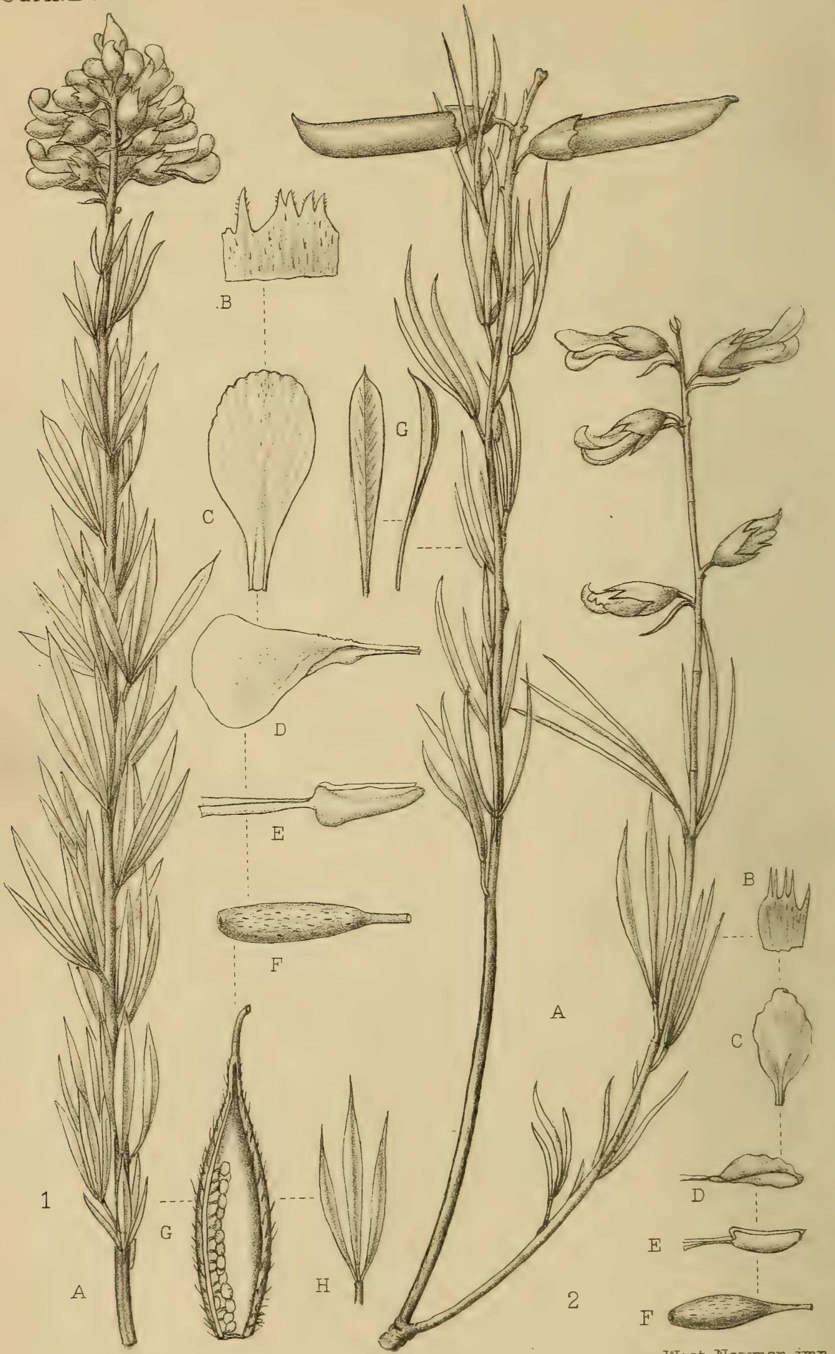
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1. Pearsonia sessilifolia *var.* Conrathii. 2. P. filifolia.

PEARSONIA, A NEW GENUS OF LEGUMINOSÆ.

By R. A. Dümmer.

(Plate 522.)

While engaged on an enumeration of the species constituting the genera *Lotononis* and *Pleiospora*, it became apparent that the presence of certain units in the former genus threatened the stability of both genera, and to obviate this, and to lessen at the same time the acute polymorphism existent in *Lotononis*, this new genus has been founded. *Pearsonia* occupies a position in the tribe Genisteæ intermediate between *Lotononis* and *Pleiospora*; it is differentiated from the latter by its exstipulate, sessile or very shortly petiolate leaves, scarcely inflated calyces, 12–30 ovuliferous ovaries, and longer legumes, which are never included within the calyces, while the straight style* with its correlated, straight carina emphasise, its distinctness from *Lotononis*.

The genus is primarily founded on *Lotononis sessilifolia* of Harvey, who, evidently recognizing the peculiarities of the species, placed it at the end of that genus in a section wholly opposed to this procedure. The genus as at present established contains eleven species, and being entirely South African, I have pleasure in dedicating it to Prof. Dr. H. H. W. Pearson, whose energy in matters pertaining to South African botany is too well known and appreciated to need any comment.

PEARSONIA Dümmer.

Genus novum *Pleiosporæ* Harvey affinis, sed foliis exstipulatis sessilibus aut breviter petiolatis, ovario 12–30 ovulato, leguminibus calyce duplo aut ad quatior longioribus distat.

Calyx Lotononidis. *Vexillum* breviter unguiculatum, rectum, concavum, oblongum vel oblongo-spatulatum, carinam æquans aut excedens; alæ rectæ, limbis sæpissime conduplicatis oblique obovatis vel oblongis, unguibus longis superne sæpius tortuosis; carina recta, longe unguiculata, limbo parvulo anguste naviculari obtuso, marginibus superioribus conduplicatis. *Stamina* omnia in vaginam supra limberam connata, antheris brevioribus basifixis, alternis longioribus dorsifixis et paullulo majoribus. *Ovarium* sessile, 12–30 ovulatum; stylus rectus, ovario sæpissime brevior, stigmate verticaliter truncato aut sæpe oblique truncato interdum papillato. *Legumen* calycem valde excedens, oblongo-lanceolatum, rectum, compressiusculum, 2-valve. *Semina* estrophiolata, funiculis incrassatis brevibus.—*Herbæ* e basi lignoso ramosæ (rarius frutices divaricati), sæpissime fulvo sericeæ, raro glabræ, caulibus annuis plerumque rectis subsimplicibus. *Folia* trifoliolata, exstipulata. *Flores* bracteati bracteolatique in racemos terminales congesti aut laxe dispositi, rarissime solitarii, flavidi. *Species 11 omnes Africæ australis incolæ.*

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* This applies to the flowering not the fruiting stage.

KEY TO THE SPECIES.

A. Plants developing subsimple, erect, annual flowering shoots from a woody perennial base.
a. Spiciform racemes densely flowered.
* Leaves sessile.
Leaflets 1·5–3 mm. broad; margin not undulate.
Vexillum, 9–11 mm. long .... (1) *sessilifolia.*
Leaflets 4–6 mm. broad; margin undulate.
Vexillum, 7 mm. long .... (4) *propinqua.*
** Leaves shortly petiolate; petioles 1–3 mm. long.
† About 25 cm. in height or taller; terminal leaflet 18–25 mm. long.
Leaflets thinly hairy and coriaceous, cuspidate with a narrow dorsal midrib. Racemes 2 cm. long...... (2) *Haygarthii.*
Leaflets densely felted and thickly coriaceous, rotundate-cuspidate with a broad dorsal midrib. Racemes prolonged, 3–13 cm. long .... (3) *Atherstonei.*
†† About 10 cm. in height; terminal leaflet 7–11 mm. long .... (5) *podalyriæfolia.*
b. Spiciform racemes laxly flowered or rarely one-flowered.
Twigs terete. Leaflets elliptic, acuminate-aristate, 15 mm. long, very prominently reticulated on the lower surface .... (6) *aristata.*
Twigs angular. Leaflets filiform or oblanceolate cuneate, 20–45 mm. long, not conspicuously reticulated on the lower surface............... (7) *filifolia.*
B. Divaricately-branched shrubs or shrublets.
i. Leaves fulvous or silvery sericeous.
Terminal leaflet 5 mm. long with a recurved mucro .... (8) *multiflora.*
Terminal leaflet 10–13 mm. long.
Flowers 5–7, umbellately-disposed; leaflets 3–4 mm. broad .... (9) *marginata.*
ii. Leaves glabrous at maturity. Leaflets linear, acute, with strongly involute margins, 1·3–1·9 cm. long.
Spiciform racemes, 3–4-flowered............... (10) *Rogersii.*
Flowers 1–4, in a spiciform raceme; leaflets 4–5·5 mm. broad............... (11) *swaziensis.*

1. P. SESSILIFOLIA, comb. nov. *Lotononis sessilifolia* Harvey in Harv. & Sond. Fl. Cap. ii. 66 (1861).

KALAHARI REGION.—Transvaal; Magaliesberg, *Burke*! (*Herb. Kew*).

Var. nov. CONRATHII Dümmer. Typæ persimilis sed undique parce sericea nec fulvo-hirsuta, foliis angustioribus tenuioribus, floribus paullulo majoribus recedit.

Habit of the species, 20–25 cm. high. *Leaves* crowded, imbricate, subsessile or very shortly petiolate; leaflets linear, cuneate, shortly acuminate, 10–30 mm. long, 1–2·5 mm. broad, relatively thin in texture, the older leaves covered sparingly with appressed silky golden hairs, the younger fulvously sericeous.* *Spike* terminal, cylindric or subhemispherical, 6–15-flowered. *Calyx* fulvously hirsute without, 7–8 mm. long. *Vexillum* subspatulate, 11 mm. long, slightly fulvously sericeous externally. *Legume* straight, narrowly oblong, 20 mm. long, densely fulvously sericeous.

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* The indumentum is probably always silvery in living specimens.

KALAHARI REGION.—Transvaal; Modderfontein; grassy slopes, *Conrath*, 127! Western Zululand; stony hillsides, *Baker*, *Herb. M. S. Evans*, 526! (*Herb. Kew*!).

2. P. HAYGARTHII, comb. nov. *Lotononis Haygarthii* N. E. Brown in Kew Bull. 1906, 17.

EASTERN REGION.— Zululand; Nkandhla, *Haygarth*, *Herb. Wood*, 7460! (*Herb. Kew*!)

Differs from the preceding in the shortly petiolate, larger leaves, which are thinly appressedly villous, and the larger flowers.

3. **P. Atherstonei**, sp. nov. *P. sessilifoliæ* valde affinis, sed indumento crassiore, foliolis et spicis longioribus differt.

Caules (annui, e radice perenni?) fulvo hirsuti, simplices vel raro parce ramosi, stricti, 0·3 m. longi, lignosi, teretes vel subtetragoni, valde foliati. *Folia* subsessilia aut breviter petiolata, arrecta; foliola sæpissime conduplicata, anguste cuneata vel oblanceolata, breviter cuspidata vel apiculata, apicula ad 2 mm. longa, terminalia 20–25 mm. longa, 4–7 mm. lata, lateralia paulo breviora vel æquilonga, coriacea, dorso valde costata, supra fusciora nitidulaque, margine paullulo incrassata. *Spicæ* terminales, solitariæ, 25–40 mm. altæ, aliquando secundæ et subnutantes. *Flores* conferti, subsessiles vel pedicellis rarius 1 mm. excedentibus suffulti; bracteola subulata, ad 5 mm. longa. *Calyx* 7 mm. longus, lobis superioribus fere obsoletis connatisve late deltoideis, lobo inferiore ceteris longiore et subulato, extra breviter fulvo hirsutus, intra magis minusve glabrescens, hirsuto-ciliolatus. *Vexilli* lamina late oblanceolata, rotundata in unguem longiusculum attenuata, cum ungui 8–10 mm. longa, postice paullulo sericea, alæ in toto 8 mm. longæ, glabræ, limbis oblique oblongis obtusis basin versus in ungues rectos sensim attenuatis; carina alis similis sed limbo minore et unguibus gracilibus longioribus. *Pistillum* 5 mm. altum, ovario valde hirsuto, stylo recto glabro.

KALAHARI REGION.—Transvaal; near Lydenburg, *Atherstone*! (*Herb. Kew*).

This species approximates most closely to *P. sessilifolia* Dümmer, but is easily distinguished by the thicker and coarser indumentum, longer leaflets and spikes, which latter are occasionally nodding.

4. **P. propinqua**, sp. nov. *P. Atherstonei* valde affinis, sed foliis usque subsessilibus brevioribus haud abrupte cuspidatis, floribus sæpius congestis recedit.

Caules circiter metrales, undique corolla excepta valde fulvosericei, stricti, graciles, simplices aut superne ramosi, angulati, dense foliosi. *Folia* subsessilia; foliola ascendentia aut patula, anguste cuneata, breviter cuspidata, lateralia ad 13 mm. longa, 4–5 mm. lata, intermedia paulo majora, dorso conspicue costata, supra medio canaliculata, nitidula, coriacea. *Spicæ* terminales, solitariæ, hemisphæricæ vel cylindricæ, 1 cm. altæ, 5-multifloræ.

Flores congesti, subsessiles, bractea cuneata rotundata breviter cuspidata 4 mm. longa; bracteolæ binæ, ad calycis basin, lineares aut subulatæ, ad 2 mm. longæ. *Calyx* 5 mm. longus, dentibus superioribus brevibus, inferiore triangulare ceteris paulo longiore, 1·5 mm. longo. *Vexillum* 6–7 mm. longum, obovatum, rotundatum, in unguem brevem sensim angustatum, dorso superne fulvido-sericulum; alæ anguste oblongæ, 8 mm. longæ, glabræ; carina longe unguiculata, alis æquilonga, limbo parvulo 2·5 mm. longo fronte obtusato. *Ovarium* 3·5 mm. longum, ubique hirsutum, stylo ovario duplo breviore recto glabro, stigmate truncato aut subcapitato.

Kalahari Region.—Transvaal; between Middelberg and the Crocodile River, *Wilms*, 261*c*! stony places near Lydenburg, *Wilms*, 261! (*Herb. Kew*).

5. **P. podalyriæfolia**, sp. nov. *P. multifloræ* Dümmer affinis, sed habitu humiliore, caulibus fere simplicibus, foliis aperte petiolatis majoribus aristato-cuspidatis, floribus minoribus differt.

Planta perennis, e basi lignoso ramosa, undique floribus exceptis fulvo sericea. Caules (annui?) erecti, graciles, simplices aut parce ramosi, ad 10 cm. alti, superne fere cernui, foliati. *Folia* petiolata, petiolis ad 2 mm. longis; foliola cuneata, breviter aristato-cuspidata, cuspe 1 mm. longo, lateralia 5–7 mm. longa, 2–3 mm. lata, terminalibus paulo majoribus, subtus costa nervisque lateralibus prominulis, subcoriacea. Racemi terminales, circiter 1·8 cm. alti, floribus subsessilibus congestis, bractea subulata. calycis tubum æquans, bracteolis binis oppositis subulatis minutis. *Calyx* extra fulvido-sericeus, 5–6 mm. longus, segmentis inter se subæquilongis. *Vexillum* 10 mm. longum, oblanceolatum, rotundatum, superne in unguem cuneatum mox evanidum, dorso superne sericulum, basin versus glabrescens; alæ 7 mm. longæ, longe unguiculatæ, frontem versus in limbos obovatos ampliatæ, fere glabræ; carina recta, alis æquilonga, fronte fimbriata, unguibus gracilibus 4–5 mm. longis. *Ovarium* suturis hirsutis, stylo ovario duplo aut tertio breviore glabro.

Kalahari Region. — Swazieland; Havelock Concession, 1200 m., *Saltmarsh*, *Herb. Galpin*, 989 (*Herb. Kew & Zürich*!).

6. P. aristata, comb. nov. *L. aristata* Schinz in Bull. Herb. Boiss. vii. 32 (1899).

Kalahari Region.—Transvaal; Abbot's Hill, near Barberton, *Galpin*, 447! stony hillsides near Barberton, 690 m., *Thorncroft* in *Herb. Wood*, 4157! *Thorncroft* in *Transvaal Mus. Herb.* 3115! in swampy places near Dalriach, 1470 m., *Bolus*, 11,762! near Barberton, *Bolus*, 7601! Houtbosch, *Rehmann*, 6262! *Bolus*, 10,096! Spitzkop at Lydenburg, *Wilms*, 263! (*Herb. Kew*).

Var. gazensis, comb. nov. *L. aristata* var. *gazensis* E. G. Baker in Journ. Linn. Soc. Bot. xl. 51 (1911).

Gazaland.—Chimanimani Mountains, 2100 m., *Swynnerton* in *Herb. Mus. Brit.*, 1418! South-eastern Rhodesia, Melsetter, 1800 m., *Swynnerton* in *Herb. Mus. Brit.*, 6196!

A common plant in the Transvaal and neighbourhood, easily distinguished by its ascending subsimple leafy branches, and

elliptic acuminate-aristate leaflets, which are subglabrous on the upper, and conspicuously netted on the lower surface; leaflets –15 mm. long, –5 mm. broad. *Flowers* solitary or in racemes; racemes occasionally secund, 2–10-flowered; bracts lanceolate-subulate, –5 mm. long. Flowers –15 mm. long. *Legumes* oblong, acute, compressed, straight, 25 mm. long, 5 mm. broad, fulvously hirsute.

The species extends into South-eastern Rhodesia and Gazaland, where it is represented by var. *gazensis*, which is distinguished by its more robust habit. Wilms's No. 263 is doubtful, as it possesses neither flowers nor fruit.

7. P. FILIFOLIA, comb. nov. *L. filifolia* Bolus in Journ. Linn. Soc. Bot. xxv. 158 (1889).

A species having much in common with *P. aristata*, but with subangular, less hirsute twigs, longer filiform or oblanceolate-cuneate, acute or obtuse leaflets, longer, laxer racemes and less hairy legumes. Leaflets 20–45 mm. long, 2–5 mm. broad. Racemes 4–7 cm. long, laxly 4–14-flowered. Flowers 10–12 mm. long, shortly pedicellate; bracts subulate, as long as the calyx-tube.

KALAHARI REGION.—Transvaal; in grassy places, Crocodile River, *Mrs. M. E. Barber*, 6! Mount Sheba, near Barberton, 1170 m., *Bolus*, 7614! Granite Range behind Barberton, 690 m., *Galpin*, 1093! (*Herb. Kew*).

8. P. MULTIFLORA, comb. nov. *L. multiflora* Schinz in Bull. Herb. Boiss. vii. 31 (1899).

A divaricately-branched shrublet, 2 ft. high, covered all over, flowers excepting, with a silvery to fulvous sericeous indumentum. *Leaflets* obovate-cuneate, rotundate or recurved-mucronate; terminal leaflets 5 mm. long, 2·5 mm. broad, the lateral slightly smaller. *Racemes* short, terminating short lateral branchlets, 2–6-flowered. *Flowers* very shortly pedicellate, 10–12 mm. long; bracts subulate, one-half or one-third as long as the fulvous sericeous calyces.

KALAHARI REGION.—Transvaal; Saddleback Mountain, Barberton, 1350–1450 m., *Galpin*, 1122! (*Herb. Kew*).

Var. STEWARTII, var. nov. Spicæ 9–15-floræ. Flores minores. Calyx brevior latiorque, 5–6 mm. longus. Vexillum 1 cm. longum, 0·5 cm. latum, postice sericulum. Carina 8 mm. longa, glabra.

KALAHARI REGION.—Swazieland, *Miss M. M. Stewart*! (*Herb. Kew*).

9. P. MARGINATA, comb. nov. *L. marginata* Schinz in Bull. Herb. Boiss. vii. 31 (1899).

Similar to the preceding in habit and flowers, but differing in the longer leaflets and umbelliform inflorescences. *Leaflets* oblanceolate-cuneate, rotundate and mucronate, 10–13 mm. long, the lateral leaflets slightly shorter. *Inflorescence* umbelliform, 5–7-flowered; pedicels 2–3 mm. long. *Legume* oblong, subacute, straight, compressed, 20–25 mm. long, 4 mm. broad, fulvously sericeous, –15-seeded.

KALAHARI REGION.—Transvaal; grassy hill slopes near Barberton, 900–1050 m., *Galpin*, 960! (*Herb. Kew*).

10. P. Rogersii, comb. nov. *L. Rogersii* Kensit in Trans. Roy. Soc. Africa, i. 147 (1909).

This species is unknown to me, but judging from the description is very distinct. "*Shrublet* 26 cm. high, with erect, glabrous branches. *Leaves* sessile or very shortly petiolate, trifoliolate; leaflets linear, narrowing towards the base, acute, spinescently mucronate, complicate, or the margins strongly involute, glabrous, the younger sericeous; terminal leaflets 1·3–1·9 cm. long, the lateral 0·7–1 cm. long, 0·15 cm. broad. *Spikes* 3–4-flowered, shortly pedunculate, axillary or terminal; bracts broadly obovate, mucronate, 0·3 cm. long, 0·25 cm. broad, sericeous. Calyx subinflated, 0·8 cm. long, sericeous; segments small, subulate, the lower segment, 0·25 cm. long. Flowers similar to those of *P. swaziensis* and *P. multiflora*."

Kalahari Region.—Transvaal; Low Veldt; rivulets, *Rogers*, *Herb. Bolus*, 430.

11. P. swaziensis, comb. nov. *L. swaziensis* Bolus in Trans. S. A. Phil. Soc. xvi. 381 (1906).

Not unlike *P. multiflora* Dümmer in habit and in the nature of the indumentum, but more leafy, with broader leaflets and fewer flowers. Leaves trifoliolate; leaflets broadly cuneate, rotundate, nearly truncate or emarginate, mucronate, with a prominent midrib beneath; terminal leaflet 10–13 mm. long, 4–5·5 mm. broad, lateral shorter or occasionally half as long. *Spikes* terminating lateral branchlets, very short, 2–4-flowered, occasionally 1-flowered.

Kalahari Region.—Swazieland; on grassy hills and in the valleys near Dalriach and Mbabane, 1320–1410 m., *Bolus*, 11,766 (*Herb. Kew*).

Description of Plate 522.

Fig. 1. *Pearsonia sessilifolia*, slightly reduced; A, calyx; B, vexillum; C, alæ; D, carina; E, ovary and style; F, ovary in longitudinal section: all enlarged. Fig. 2. *P. filifolia*, nat. size; A, alæ; B, carina; C, vexillum; D, calyx; E, ovary and style, × 2.

ALABASTRA DIVERSA.

By Spencer le M. Moore, B.Sc., F.L.S.

XXII.—Asclepiadaceæ Africanæ novæ vel rariores.*

(Concluded from p. 346.)

Xysmalobium tenue, sp. nov. Rhizomate tuberoso tuberibus subfasciculatis fusiformibus sparsim radicelliferis collo brevi crasso coronatis, caule ultraspithameo erecto simplici deorsum nudo sursum distanter folioso prima juventute unifariatim pubescente cito glabro, foliis sessilibus anguste linearibus acutis marginibus involutis glabris, umbellis 10–22 floris terminalibus raro interaxillaribus his dum adsint pedunculo brevi unifariatim pubescente

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* Specimens of all the species described or referred to in this memoir are preserved in the Herbarium of the British Museum.

insidentibus illis sessilibus, bracteis parvis subulatis quam pedicelli filiformes minute pubescentes multo brevioribus, calycis segmentis lanceolato-oblongis acutis puberulis reflexis, corollæ parvæ alte partitæ lobis oblongis obtusis extus puberulis a basi reflexis, coronæ phyllis parvulis ex columna staminea prope basin ortis late ovatis obtusissimis reflexis dente parvo cum sociis conjunctis, antherarum alis prominentibus deorsum divergentibus appendicibus suborbicularibus stigmati concavo impendentibus.

Hab. Angola, near Kossuango, skirting the meadows along the Kuiriri; *Gossweiler*, 3231.

Caules 2·5–3 dm. alt., 1 mm. diam.; internodia circa 6–7 cm. long. Folia 6–9·5 cm. long., circa ·5 mm. lat., in sicco viridia. Pedunculi summum 5 mm. long. Bracteæ 1·5–3 mm. long., pedicelli 7–8 mm. Flores virescentes. Calycis segmenta 1·25 mm. long. Corollæ lobi 3 × 1 mm. Coronæ phylla crassiuscula, ·35 mm. long., basi ·75 mm. lat.; dentes interpositi ·25 mm. long. Columna staminea 1·75 mm. long. Antherarum alæ 1·25 mm. long.; appendices ·8 mm. long. Pollinia oblongo-pyriformia, ·7 mm. long., caudiculæ ·25 mm., glandula ·3 mm.

Very close to *X. decipiens* N. E. Br., but more slender in habit with narrower leaves, markedly smaller flowers with reduced coronal leaves and relatively larger interpolated teeth. The pollinia also are decidedly smaller.

Xysmalobium congoense, sp. nov. Herba ascendens bispithamea, caule deorsum nudo sursum bene folioso bisulcato sulcis pubescentibus exemptis glabro, foliis sessilibus elongatis anguste linearibus obtuse acutis glabris, umbellis apicem versus caulis paucis interpetiolaribus circa 16-floris, pedunculis validis foliis multo brevioribus ut pedicelli se ipsos subæquantes pubescentibus, calycis segmentis lanceolatis acutis microscopice puberulis, corollæ parvulæ lobis calycem excedentibus ovato-oblongis obtusis extus microscopice puberulis, coronæ phyllis minimis tubercula referentibus juxta basin columnæ stamineæ insertis, antherarum appendicibus fere orbicularibus supra stigma apice leviter elevatum inflexis.

Hab. Belgian Congo, Lovoi River, Katanga; *Kassner*, 3354.

Caulis summum 2 mm. diam., rigidus etsi gracilis. Folia 8–9 cm. long., circa 2 mm. lat., margine cartilaginea. Pedunculi 4–7 mm. long., juniores gradatim imminuti. Bracteæ subulatæ, puberulæ, circa 1 mm. long. Pedicelli circa 4 mm. long. Calycis segmenta longit. 1 mm. paullulum excedentia. Corollæ verisimiliter atro-violaceæ lobi 2 mm. long. Columna staminea vix 1 mm. long. Antherarum appendices fere 1 mm. diam. Pollinia oblongo-ovoidea, caudiculis necnon glandulæ æquilonga, ·3 mm. long.

To be inserted next *X. gramineum* S. Moore, which has shorter and somewhat broader leaves and markedly larger (although still small) flowers with longer calyx and corolla-lobes, larger and more flattened coronal leaves, a broader staminal column and differently appendaged anthers.

X. SESSILE Decne. var. PARVIFLORA, var. nov. Folia subtus pubescentia vel fere glabra, 5–6 × 2–2·5 cm. Calycis segmenta lineari-lanceolata, sursum longe attenuata, 6–7 mm. long. Corollæ lobi 7 mm. long. Coronæ phylla 3·5–4 mm. long.

Hab. Angola, Kubango, in open thickets near Forte Princeza Amelia, and in moist meadows near Munoque; *Gossweiler*, 481, 2313, 3432.

Xysmalobium Gossweileri, sp. nov. Caule satis elato erecto valido copiose folioso pubescente, foliis elongatis brevipetiolatis oblongo-lanceolatis acutis basi late truncatis breviterve hastatis firme membranaceis utrinque scabridis; umbellis pedunculatis foliis brevioribus plurifloris, pedunculis pedicellisque pubescentibus his floribus multo longioribus, bracteis parvulis setaceis pubescentibus, calycis segmentis lanceolatis acutis vel acuminatis extus hispide pubescentibus, corollæ alte partitæ lobis calycem excedentibus patentibus ovato-oblongis obtusis intus dimidio distali pilis albis densis obsitis, coronæ phyllis ex columna staminea paullulum supra basin oriundis a columna staminea facile superatis late obovatis sursum cuspidato-attenuatis apice obtusis crassiusculis utrinsecus papillatis intus carina obtusa parum aspectabili indutis, glandulis 5 minutis coronæ phyllis interjectis, filamentis maxima pro parte inter se liberis antherarum appendicibus ovatis supra stylum truncatum inflexis, folliculis fusiformibus pubescentibus pilis longis filiformibus onustis.

Hab. Angola, Cubango, near Forte Princeza Amelia; marshes along the Macuebe River near Munonque; and near the River Kutchi; *Gossweiler*, 2367, 3543, 4126.

Planta sesquimetralis. Caulis e rhizomate tubereo fistulosus, superne compressus, ± 5 mm. diam. Folia vetustiora 12–18 cm. long., basi 2–3 cm., medio 1·8–2·5 cm. lat., summa gradatim imminuta; nervi laterales plurimi; petioli sæpius 4–12 mm. long., pubescentes. Pedunculi 1– fere 4 cm. long. Bracteæ circa 4 mm., pedicelli 10 mm. long. Calycis segmenta 4·5 mm. long. Corollæ dilutissime viridis lobi 6·25 mm. long., 3 mm. lat. Coronæ phylla a columna staminea satis distantia, 2·5 mm. long., vix 3 mm. lat. Columna staminea 4 mm. long. Pollinia pyriformia, longit. 1 mm. paullulum excedentia; caudiculæ ·5 mm., glandula ·6 mm. long. Folliculi 6 cm. long., fere 2 cm. lat.

To be inserted in the genus next *X. barbigerum* N. E. Br. The chief difference lies in the coronal lobes, those of *X. Gossweileri*, relatively shorter with respect to the staminal column and standing out from it, being much broader and provided with a distinct cusp at the end.

Xysmalobium clavatum, sp. nov. Caule ± spithameo erecto fere a basi folioso pubescente radice tuberiformi globoso vel subgloboso suffulto, foliis oblongo-oblanceolatis emarginatis nisi obtusis obtusissimisve (nonnunquam attamen acutis) basin versus in petiolum brevem coartatis pergamaceis utrinque fere glabris, umbellis leviter extra-axillaribus sessilibus (infimave pedunculata) 3–5-floris, bracteis subulatis rigidis, pedicellis floribus sæpe longioribus pubescentibus, calycis segmentis lanceolatis acutis puberulis, corollæ parvæ lobis patentibus obovato-oblongis obtusis calycem excedentibus glabris, coronæ phyllis columnæ stamineæ basi insertis eandemque superantibus clavatis intus edentatis sed inferne canaliculatis a dorsoque compressis superne subteretibus, antherarum appendicibus suborbicularibus supra stigma planum inflexis, folliculis inferne stipitatis superne fusiformibus apice incurvo-rostratis levibus.

Hab. Angola, in primeval woods between Cuannsha and the Mungombe rivulet, and at Kuiriri; *Gossweiler*, 2205, 3435.

Folia pleraque 3–4 × 1–2 cm. (rarius 6 cm. long.), subtus in sicco aliquanto glauca; costa media puberula, pag. inf. eminente; reticulum laxum, utrinque sat prominens; petioli 3–4 mm. long. Umbellæ infimæ pedunculus 8 mm. long. Bracteæ circa 2 mm. pedicelli 5–6 mm. long. Flores dilute virescentes. Calycis segmenta 2·5 mm. long. Corollæ lobi 5 × 3 mm. Coronæ phylla 3 mm. long., inferne ·8 mm. superne 1·25 mm. lat. Columna staminea 1·5 mm. long. Pollinia pyriformia, ·4 mm. long.; glandula ·25 mm., caudiculæ ·3 mm. long. Folliculi calycis segmentis persistentibus stipati fere 12 cm. long., inferne 3–4 mm. lat., superne usque ad 13 mm. dilatati, horum rostrum fere 2 cm. long. Semina 3 × 1·25 mm.; coma 3·5 cm. long.

The shape of the leaves together with the small flowers and their clavate coronal leaves are the chief distinguishing features of this species.

X. CECILÆ N. E. Br. The extension in the range of this Rhodesian plant to Angola is a fact worth mention. The plant was found in thickets about the Forte Princeza Amelia (*Gossweiler*, 2258). The flowers of the Angolan specimens are rather smaller than the Rhodesian, with somewhat shorter and narrower coronal lobes, and very broad anther-wings reaching further down than the place of insertion of the coronal lobes.

Schizoglossum semlikense, sp. nov. Caule trispithameo simplici tenui fere a basi etsi sparsim folioso bifariatim pubescente, foliis subsessilibus anguste linearibus obtuse acutis margine revolutis puberulis, umbellis perpaucis sessilibus 3–4-floris, pedicellis floribus longioribus gracilibus pubescentibus, calycis segmentis lanceolatis breviter acuminatis extus puberulis, corollæ lobis oblongo-ovatis obtusis dorso piloso-puberulis intus microscopice puberulis, coronæ phyllis ex columna staminea paullulum supra basin ortis ovatis vel ovato-oblongis acuminatis apice leviter inflexis margine obscure undulatis intus planis raro evanescente bicarinulatis, antherarum appendicibus suborbicularibus supra stigma planum inflexis.

Hab. Ruwenzori district, Semliki Valley; *Kassner*, 3282*a*.

Caulis 1 mm. diam. vel paullulum ultra. Folia ± 3 cm. long., (summa imminuta), circa ·5 mm. lat.; internodia ± 8 cm. long. Pedicelli 5–6 mm. long. Calycis segmenta 2 mm. long. Corollæ lobi 3 × 1·5 mm. Coronæ phylla 1·5 mm. long.; columna staminea totidem. Antherarum appendices ·4 mm. diam. Pollinia oblonga ·35 mm. long.; caudiculæ breves ·1 mm., glandula ·2 mm. long.

This is close to *S. fuscopurpureum* Schlechter & Rendle, an Angolan species with larger and probably differently coloured flowers and broader, besides larger coronal leaves more or less

plainly 3-toothed at the apex. *S. fuscopurpureum* is a very rare plant, represented hitherto in this country only by a drawing and a few flowers in the Welwitsch herbarium. It is in Mr. Gossweiler's Angolan collection, who found it growing among grasses on the sandy banks of the Cubango River (no. 2315).

S. Baumii Schlechter, also very rare, is in the same collection; the locality is, marshes in the valley of the River Tiengo, Kiuto (nos. 3669, 3763).

Schizoglossum Kassneri, sp. nov. Planta bispithamea radice elongato inferne fusiformi suffulta, caule erecto deorsum tereti sursum compresso satis gracili superne in facie una pubescente ceteroquin glabro, foliis oppositis raro ternis sessilibus linearibus apice brevissime acuminatis glabris, umbellis interpetiolaribus vel terminalibus quam folia brevioribus, pedunculis pedicellos subæquantibus pubescentibus, bracteis sat longis setaceis puberulis, calycis segmentis anguste lineari-lanceolatis acuminatis dorso minutissime pubescentibus, corollæ viridis lobis calycem excedentibus ovato-oblongis obtusis glabris, coronæ phyllis columnæ stamineæ usque ad 1·5 mm. adnatis eamque breviter superantibus erectis oblongis apice truncatis intus inappendiculatis concavis tenuibusque, antherarum appendicibus late rotundatis supra stigma planum inflexis.

Hab. Belgian Congo, Lubi River; *Kassner*, 3303.

Radix 14 cm. long., hujus pars fusiformis 35 × 14 mm., radicellis aliis fusiformibus, 20–30 × 8–12 mm., aliis fribrillosis. Folia plerumque 6–10 cm. long., 2–3 mm. lat., infima imminuta. Pedunculi 7–12 mm. long., juniores gradatim breviores; bracteæ adusque 6 mm. long., sæpe vero circa 4 mm. Florum pansorum pedicelli 10–12 mm. long. Calycis segmenta 4 mm. long. Corollæ lobi 8 × 4 mm. Coronæ phylla 2·5 × ·8 mm. Columna staminea 3·5 mm. long. Antherarum appendices 1·25 × 1·25 mm. Pollinia ovoideo-oblonga, ·75 mm. long.; caudiculæ ·35 mm., glandula ·4 mm. long.

The small green flowers with narrower calyx-segments and small truncate coronal leaves serve easily to distinguish this from *S. Carsoni* N. E. Br.

Schizoglossum Gossweileri, sp. nov. Radicibus partim fibrosis partim in tuber fusiforme dilatatis, caule erecto circiter spithameo satis tenui sursum folioso pubescente dein puberulo, foliis breviter petiolatis oblongo-oblanceolatis apice obtusissimis ipso subito mucronatis basi angustatis papyraceis glabris, umbellis interaxillaribus pseudoterminalibusve pedunculatis circa 8-floris, pedunculis ut pedicelli sibi ipsis longiores vel breviores pubescentibus, bracteis lineari-setaceis pedicellis sæpe brevioribus, calycis segmentis triangulari-lanceolatis acuminatis puberulis, corollæ lobis ovato-oblongis retusis calyce longioribus dimidio abaxiali dorso puberulis, coronæ phyllis usque ad 1 mm. columnæ stamineæ adnatis ovatis crassiusculis intus bicarinatis sursum appendice oblonga obtusissima columnæ stamineæ impendente onustis, antherarum appendicibus late ovatis acuminatis, stigmate leviter concavo.

Hab. Angola, near Forte Kolui, Kubango; *Gossweiler*, 2177.

Radicum tubera 12–25 mm. long., 5–8 mm. lat., pars tenuis ± 2 cm. long., circa 1 mm. lat. Caulis vix 2 mm. diam. Folia 4–4·5 cm. long., 10–12 mm. lat. (spec. unici nobis obvii par infimum modo 20 × 7 mm.); petioli 2–3 mm. long. Pedunculi 4–8 mm. long., bracteæ 3–4 mm., pedicelli 4–5 mm. Flores virescentes. Calycis segmenta ægre 4 mm. long. Corollæ lobi 6 × 3 mm. Coronæ phylla (appendice 1 × ·75 mm. exempta) 1·75 × 1·5 mm. Columna staminea 2·25 mm. long. Pollinia oblongo-pyriformia, ·5 mm. long.; caudiculæ ·3 mm., glandula ·25 mm. long.

The position of this plant in the genus is uncertain. It should find a place among the broad-leaved species, but these have their leaves broad-based, whereas *S. Gossweileri* has them narrowing into the petiole. Besides this, the plant can be told by its small flowers and its corona.

Odontostelma minus, sp. nov. Caule e radice tuberiformi ascendente gracili fere a basi folioso unilateraliter puberulo, foliis sessilibus anguste linearibus acutis margine revolutis fere omnino glabris, umbellis paucifloris inferioribus longe summis breviter pedunculatis pedunculis unilateraliter pubescentibus, pedicellis floribus circiter æquilongis pubescentibus, calycis segmentis ovato-lanceolatis acutis quam corollæ campanulatæ lobi obovato-oblongi emarginati multo brevioribus, coronæ phyllis ima basi connatis parvulis quadratis margine terminali denticulatis intus lamina transversa auctis, antherarum alis prominentibus appendicibus late ovatis super stigma planum inflexis.

Hab. Angola, between Forte Princeza Amelia and Rio Cubango; *Gossweiler*, 2332, 4210 in part.

Radicis pars tuberiformis oblonga vel ovoidea (17 × 11 vel 22 × 6 mm.), collum sat validum, erectum, 8–15 mm. long. Caulis spithameus, 1–1·5 mm. diam. Folia summum 6 cm. long., sed sæpius breviora, circa 1 mm. lat. Pedunculi summum 45 mm. long., sæpe modo 12–18 mm. Pedicelli ± 5 mm. long. Flores dilute purpureo-virescentes. Calycis segmenta 2 mm. long. Corollæ lobi 4 × 2 mm. Corona alt. ·5 mm. Columna staminea 2 mm. long. Pollinia oblonga, ·5 mm. long; caudiculæ latæ, glandulæ æquilongæ, ·2 mm. long. Folliculus hucusque valde crudus anguste fusiformis, utrinque præsertim apicem versus longe angustatus, minute puberulus, 8 cm. long., inferne 1–1·5 mm., juxta medium 4 mm., sub apice vix 1 mm. lat.

With the habit and general appearance of *O. Welwitschii* the present plant differs from it in the small flowers, and in the still shorter and in several respects different corona.

I prefer to keep this apart from *Schizoglossum*, in which N. E. Brown would place it.

Cynanchum Gossweileri, sp. nov. Caule volubili crassiusculo glabro, foliis late ovatis verisimiliter acutis basi rotundatis nisi rotundatissimis nequaquam cordatis membranaceis glabris petiolis se ipsa semiæquantibus insidentibus, floribus parvis in racemis sat longipedunculatis plurifloris dispositis, bracteis minimis subulatis, pedicellis flores longe excedentibus pubescentibus, calycis segmentis oblongis obtusis extus minute pubescentibus, corollæ lobis oblongo-lanceolatis obtusis glabris, corona quam corolla paullo breviore triente superiori 10-loba lobis oblongis vel subulatis acutis nisi obtusis vel emarginatis vel bifidis intus prominenter 5-carinata basique laminis 5 ovatis integris bilobisve cum carinis alternantibus onusta, columna staminea quam corona paullo breviore hujus parte filamentosa quam pars antherifera paullulum longiore, antherarum appendicibus suborbicularibus inflexis crassiusculis, stigmate concavo antherarum appendicibus æquialto.

Hab. Angola, banks of River Luinha, between Luinha and Canhaca railway-station, an unique specimen; *Gossweiler*, sine no.

Folia circa 4·5 × 3·5 cm., in sicco brunneo-viridia, sub lente arcte reticulata; petioli 2–2·5 cm. long. Pedunculi 2·5 cm. long., racemi usque ad 5 cm.; bracteæ 1 mm., pedicelli 4–6 mm. long. Calycis segmenta 1·5 mm. long. Corollæ lobi 3·5 mm. long. Corona 2·5 mm. alt.; hujus lobi ·75 mm. long., carinæ 1 mm., laminæ ·75 mm. long. Columna staminea 1·75 mm. long.; hujus pars filamentosa vix 1 mm. long. Pollinia pyriformia, ·45 mm. long.; caudiculæ ·2 mm., glandula ·35 mm. long.

Nearest *C. schistoglossum* Schlechter, which has differently shaped leaves, smaller flowers with shorter and broader corolla-lobes, a much shorter corona without prominent keels, and no filamentary part to the staminal column.

Leptadenia clavipes, sp. nov. Caule volubili ramoso crebro folioso glauco pube densa minutissima obducto, foliis petiolo satis longo insidentibus ovatis breviter acuminatis basi rotundato-truncatis obtusisve rarissime cuneatis pergamaceis utrinsecus glabris, umbellis interpetiolaribus pedunculis validis plurifloris quam folia brevioribus fultis, pedicellis quam pedunculus plerumque brevioribus clavatis minutissime pubescentibus, calycis parvuli ultra medium lobati minutissime tomentosi segmentis deltoideis acutis extus fere glabris, corolla anguste campanulata paullo ultra medium divisa lobis oblongis obtusis, coronæ phyllis corollæ loborum sinubus insertis minutis late deltoideis apice pilis paucis penicillatis.

Hab. South-eastern Abyssinia, Schebelli; *Donaldson Smith.*

Caulis 3 mm. diam., ramuli ultimi 1·5 mm., teres vel subteres, ramuli vero compressi. Foliorum limbus summum, 6 × 3·5 cm., sed sæpissime minor, e. g. 3·5-4·5 × 1·7–2·5 cm., supra glauca subtus pallidissima; costa media pag. sup. impressa pag. inf. eminens; costæ laterales utrinque circa 8; petioli ± 15 mm. long., tenues. Pedunculi circiter 10 mm. long. Pedicelli 4-10 mm. long., inferne ·75 mm. sub flore 1·5 mm. diam. Flores verisimiliter virides. Calyx 1·25 mm. long.; hujus lobi vix 1 mm. long. Corollæ tubus 1·5 mm. long.; lobi 2 mm. long. Coronæ phylla ·3 mm. long., columna staminea ·75 mm. Pollinia triangulari-pyriformia, ·3 mm. long.

This can be identified on sight by the small flowers on their clavate pedicels.

Ceropegia secamonoides, sp. nov. Caule volubili tenui subsparsim folioso pubescente, foliis anguste oblongo-oblanceolatis acuminatis basi obtusis papyraceis utrobique sparsim pubescentibus, floribus in cymis interaxillaribus subumbellatis sat longe pedunculatis paucifloris dispositis, pedunculis ut bracteæ subulatæ pedicellique has facile superantes pubescentibus, calycis segmentis lineari-lanceolatis longe acuminatis dorso pubescentibus, corollæ extus pubescentis tubo juxta basin inflato inde adusque fauces cylindrico ipsis faucibus parum dilatato lobis quam tubus fere triplo brevioribus late oblongis replicatis apice connatis, coronæ exterioris 5-lobi lobis triangulari-ovatis obtusis villosulis coronæ interioris phyllis coronam exteriorem certe excedentibus ligulatis sursum incurvis, antheris anguste ovoideis harum alis prominentibus, folliculis lineari-fusiformibus glabris.

Hab. Angola, Luassingua, T'Chirandongambe; *Gossweiler*, 2552.

Folia 5–6 cm. long., 7–10 mm. lat., in sicco brunneo-viridia; petioli 4-7 mm. long., pubescentes. Pedunculi plerique 2–3·5 cm. long., rarissime modo 1 cm. Bracteæ 2–3 mm., pedicelli plerumque 5–8 mm. long. Calycis segmenta 4 mm. long. Corolla in toto 21 mm. long.; tubus 15 mm. long., juxta basin ægre 5 mm. lat., superne 2·5 mm., faucibus 4 mm. lat.; lobi 6 mm. long. Corona exterior 2·5 mm. long., hujus lobi 1·75 × ·75 mm.; coronæ interioris phylla ad 2 mm. ex coronam ext. eminentia. Columna staminea 2 mm. long.; antherarum alæ 1 mm. long. Folliculi 5 cm. long.; semina 5 mm. diam., coma circa 3 cm. long.

According to N. E. Brown's clavis (Fl. Trop. Afr. iv. i. p. 436) this should be placed next *C. convolvuloides* A. Rich., a species it by no means resembles in its flowers.

C. UMBRATICOLA K. Schum. Mr. Gossweiler sends a specimen of this remarkable and extremely rare plant, the only specimen in this country. It grows in woods at Coyembe, Kubango (no. 2286).

Brachystelma arenarium, sp. nov. Planta semispithamea rhizomate tuberoso radices paucas simplices crassas emittente, caule erecto inferne simplici nudoque superne ramos foliosos sparsim gignente pubescente dein glabrescente, foliis brevipetiolatis linearibus vel lineari-oblongis obtuse acutis basi obtusis membranaceo-crassiusculis utrinque sparsim scabriusculo-pubescentibus, umbellis interaxillaribus sessilibus paucifloris, pedicellis quam flores longioribus griseo-pubescentibus, calycis segmentis quam corolla multo brevioribus lineari-lanceolatis acutis pubescentibus, corollæ campanulatæ extus puberulæ tubo quam lobi triangulari-deltoidei acuti duplo longiore, coronæ exterioris phyllis bipartitis segmentis uno latere coronæ int. phyllis adnatis late oblongis apice pulvinatis coronæ interioris phyllis ut coronam ext. ita antheras longe superantibus spathulato ligulatis emarginatis superne incurvis, stylo apice truncato.

Hab. Angola, in alluvial sandy pastures along the bank of the Cubango, near Forte Princeza Amelia; *Gossweiler*, 2312.

Tuber globulare, carnosum, haud lactifluum. Folia plerumque 3–6 cm. long., 3–8 mm. lat.; petioli 2–3 mm. long. Umbellæ 3–5-floræ, 12–15 mm. diam. Pedicelli 7–10 mm. long. Calycis segmenta 2 mm. long. Corolla atropurpurea, hircina, 7 mm. diam.; tubus 6 mm. long., basi 4 mm., faucibus 6 mm. lat.; lobi

3 mm. long. Corona basi ad 1 mm. columnæ stamineæ adnata; coronæ ext. phylla 1 mm. long., horum segmenta ·8 mm. long.; coronæ int. phylla fere 3 mm. long. Columna staminea 2·5 mm. long. Antheræ oblongæ, ·5 mm. long. Pollinia late ovoidea, ·4 mm. long.; glandula ·2 mm. long.

This has much the appearance of the South African *B. decipiens* N. E. Br., but can be told at once from it by the markedly shorter and broader corolla-lobes.

Brachystelma elegantulum, sp. nov. Glabrum, caule erecto rarissime ramoso gracili tereti subdistanter folioso, foliis elongatis sessilibus anguste linearibus acutis saltem in sicco longitrorsum complicatis, umbellis terminalibus vel axillaribus usque ad 10-floris bracteis parvis linearibus stipatis, pedicellis filiformibus bracteis multo longioribus, calycis segmentis linearibus acutis recurvis, corollæ campanulatæ lobis tubum multo excedentibus basi late triangularibus sursum in caudam longam filiformem anthesi ceteris cito dissociatam desinentibus, corona exteriore cupuliformi ore undulata columnam stamineam breviter superante coronæ interioris phyllis abbreviatis subclavatis basi dorso coronæ ext. adnatis, antheris stigmati plano incumbentibus.

Hab. Angola, near Forte Dom Affonso; *Gossweiler*, 2944.

Caulis circa 6 dm. alt., inferne 1·5–2 mm. diam., superne ·5–1 mm. ut folia in sicco viridia; internodia pleraque 6–8 cm. long. Folia summum 12 cm. long., sæpius vero 8–10 cm., explanata 2 mm. lat. vel minus. Bracteæ 1·5 mm. long.; pedicelli 10 mm. Flores theobromini. Calycis segmenta 3–4 mm. long. Corollæ tubus 2 mm. long., dimidio inf. angusta, sursum subito dilatatus; loborum pars basalis 3 mm. long., basi 2·5 mm. lat., pars attenuata 10 mm. long., ·3 mm. lat. Corona exterior ·6 mm. alt.; coronæ interiores loborum pars libera ·2 mm. long. Columna staminea 1 mm. long. Pollinia pyriformia, ·3 mm. long.

This is very distinct among African species; in habit the Indian *B. glabrum* Hook. fil. bears some resemblance to it, but here the likeness ends.

Tenaris Browniana, sp. nov. Glabra caule erecto gracili rari-ramoso perpaucifolioso, foliis sessilibus elongatis anguste linearibus acutis marginibus involutis, floribus in fasciculis lateralibus vel terminalibus sessilibus paucifloris dispositis, pedicellis longis tenuissimis cernuis, calycis segmentis lanceolatis acutis corollæ tubo æquilongis, corollæ paullo ultra medium divisæ lobis late oblongo-ovatis obtusis, coronæ phyllis fere ex apice columnæ stamineæ oriundis exterioribus ovato-oblongis sursum incurvis vix usque medium bilobis lobis oblongo-triangularibus acutis phyllis interioribus parvulis e basi lata subulatis superne incurvis, antheris incurvis.

Hab. Angola, Kuanaral, rare in grass-grown Mummua-woods near the River Domba; *Gossweiler*, 3062.

Radices ex scheda cl. detectoris fasciculatæ, fusiformes, carnosæ. Caules circa ad 6 dm. alt., inferne 2 mm. superne vix 1 mm. diam. Folia circiter 7 cm. long., in sicco ·5 mm. lat., humectata vero explanataque 1 mm., in sicco viridia. Florum fasciculi 6–9-flori,

prope apicem ramorum foliis orborum geniti. Pedicelli 3·5–4 cm. long. Calycis segmenta 1 mm. long. Corollæ atropurpureæ tubus 1 mm. long.; lobi 1·25 mm. long., basi ·8 mm. lat. Coronæ phylla ext. 1 mm. long., horum lobi ·45 mm.; phylla int. ·5 mm. long. Pollinia ·2 mm. long.

Easily recognized by the slender habit and the fascicles of small flowers on long nodding pedicels.

The genus has comprised hitherto seven species, of which two are natives of Somaliland, one of German East Africa, and four of South Africa, ranging from Eastern Cape Colony to the Transvaal. A considerable extension of the area occupied by the genus is shown by the occurrence in Angola of the species under notice.

Caralluma Gossweileri, sp. nov. Planta crebro ramosa ramis patulis prostratis radicantibus 4-angulatis angulis lobis magnis triangularibus præditis, floribus circa 7-nis in umbellis sessilibus approximatis lateralibus apicalibusve dispositis, bracteis lanceolatis acuminatis quam pedicelli crassiusculi multo brevioribus, calycis segmentis ovato-lanceolatis acuminatis patentibus, corollæ alte partitæ tubo subhemisphærico lobis elongatis anguste lineari-lanceolatis acutiusculis vivis extus nitidis intus rugosis, coronæ phyllis exterioribus ad 1 mm. supra basin ex columna staminea oriundis basi coronæ phyllis int. adnatis scutiformibus margine superiori dentatis phyllis interioribus stamina longe excedentibus linearibus obtusis inferne subhorizontalibus superne recurvis basi dorso prominenter gibbosis.

Hab. Angola, Kubango, in thickets on ferruginous rocky ground near Forte Princeza Amelia; *Gossweiler*, 2098.

Radices satis numerosæ, crassiusculæ, sub apice solummodo ramosæ nisi simplices, circa 4·5 mm. long. Caulis in sicco circiter 10 mm. diam., hujus lobi 13 mm. alt. Bracteæ 3 mm. long.; pedicelli ± 15 mm. long. Calycis segmenta 5·5 mm. long., basi 3·5 mm. lat. Corolla theobromina intus fusca; tubus intus rugosus, 7 mm. long., 8 mm. lat.; lobi 4·5 cm. long., juxta basin 5 mm., medio 3 mm. lat., indeque gradatim angustati. Coronæ ext. phylla 2·5 mm. long., 1·5 mm. lat.; coronæ int. 3·5 mm. long. Columna staminea 2·5 mm. long. Antheræ ·75 mm. long. Pollinia subquadrata, ·65 mm. long.

This has much the appearance of *C. lutea* N. E. Br., a yellow-flowered species from the Transvaal with shorter ciliate corolla-lobes, broader outer coronal leaves and inner coronal leaves with two teeth one behind the other.

MARSUPELLA APICULATA Schiffn. IN BRITAIN.

By W. E. Nicholson.

Two of the species mentioned by Mr. Macvicar in his excellent *Student's Handbook of British Hepatics* as likely to occur in Britain have already been recorded as British on p. 287, and I am glad to be able to add a third in the shape of *Marsupella apiculata*

Schiffn., which I gathered when botanizing with Mr. H. H. Knight in July last on Ben Muich Dhui, where it was growing near patches of melting snow at an altitude of about 3700 ft., in company with *M. condensata*, *M. Stableri*, *Gymnomitrium varians*, and other constituents of the alpine *Marsupella*-formation. No doubt this small plant is frequently overlooked and the following description drawn largely, that of the sexual plants wholly, from the diagnosis in *Die Möose des Sarekgebietes* by Arnell and Jensen (Stockholm, 1907) may be of assistance in distinguishing it.

Marsupella apiculata Schiffn. in Œsterr. bot. Zeitschr. 1903, 249—Dioicous. In dense brownish-green cushions, often with a reddish tinge, from ·5 to 2 cm. high, resembling a small form of *Gymnomitrium concinnatum* in general appearance. Stem erect, but little branched, with stolons, basal part with a few rhizoids. Leaves so densely imbricated as to be scarcely distinguishable individually, cordate to quadrate, broadest towards the base, very concave, divided above to one-fifth by a broad, but acute, sinus into two sharply-pointed apiculate lobes; apiculus of one or two hyaline cells, margin of leaves with a band of 1–2 small, thin-walled, quadrate, hyaline cells. Other leaf-cells roundish-quadrate or hexagonal with small but well-marked trigones 12–16 μ in the leaf-apex and 16–20 μ in the middle of the leaf. Cuticle smooth. Male plants slightly stouter, somewhat clavate; bracts larger than the leaves, bearing 2–3 antheridia in their axils. Female plants much stouter at the apex; bracts much larger than the leaves, imbricate, margin in 2–5 cells broadly hyaline and irregularly crenulate. Perianth adnate below to the bracts to one-third and reaching to two-thirds of the height of the bracts, free portion conical, slightly plicate, mouth contracted, dentate. Spores smooth, reddish brown, about 10 μ. Elaters slightly narrower than the spores, of two reddish brown spirals.

The plant was gathered as probably a starved form of *Gymnomitrium concinnatum*, from which, however, it is usually distinguishable by its much smaller size and darker colour, generally with some tinge of red. The resemblance still further disappears under the microscope, and the smaller cells, less thickened at the angles, the smooth cuticle, the hyaline margin and generally apiculate lobes of the leaves will seldom admit of any difficulty in separating it from this species. For a long time *M. apiculata* was confused with *M. condensata* (Angstr.) Kaal., but it may readily be distinguished from this species, with which it frequently grows, by the more densely imbricate leaves with a sharper sinus, as well as by their hyaline border and apiculus. *M. apiculata* is widely distributed in the mountains of Scandinavia, and it is found more sparingly in the Alps of Central Europe. No doubt it will be found to occur on several of the higher Scotch mountains.

The identification of the plant from Ben Muich Dhui has been confirmed by Mr. Macvicar.

EARLY LANCASHIRE AND CHESHIRE RECORDS.

By C. E. Salmon, F.L.S.

The greater part of an interesting herbarium formed by George Crosfield (1785–1847) has lately come into my hands. It contained many Lancashire and Cheshire plants, intermixed with which were some of an earlier date collected by George Crosfield's father, also George by name. The latter was born near Kendal, Westmorland, March 22nd, 1754, lived at Warrington and Lancaster, and died at the latter place, Oct. 10th, 1820. Some of his specimens, collected about 1780, are the first evidences of the species in Lancashire. Mr. J. A. Wheldon has kindly furnished some interesting notes on the records, which are incorporated here. It may be of service to future compilers of county or local lists if the following are placed on record:—

From the Collection of George Crosfield the elder (1754–1820).

Ranunculus Lenormandi F. Schultz. In the ditches on Lancaster Marsh.

Papaver Rhœas L. In the fields about Lancaster, Poulton, &c., among the corn, 1789.

Radicula officinalis Groves. In the brooks and ditches on Lancaster Marsh, 1782.

Cardamine amara L. By the riverside opposite Bulk. At Hornby, 1782. "Still occurs there," *J. A. W.*—*C. pratensis* L. Common in the meadows and moist pastures about Lancaster, 1782.

Viola palustris L. About Hornby in the ditches.

Stellaria Holostea L. Very common in the woods and hedges about Lancaster.

Arenaria peploides L. At Poulton, about three miles from Lancaster, on the seashore, 1782. "Still occurs there," *J. A. W.*

Linum catharticum L. Common in dry pastures about Lancaster, 1782.

Prunus Padus L. In the woods and hedges betwixt Kendal and Ambleside, 1782.

Potentilla palustris Scop. In a bog at the bottom of Greaves, near Lancaster, 1782.

Chærophyllum temulum L. Very common in hedges, &c., about Lancaster, 1782.

Veronica scutellata L. On Lancaster Moor. In the ditches between Torisholme and Bare, 1782.—*V. Beccabunga* L. Common in the ditches and rivulets about Lancaster, 1782.

Allium ursinum L. By the side of the brook betwixt Lancaster and Near Bulk, 1782.

Eriophorum angustifolium Roth. In marshes and bogs on Lancaster Moor, 1782.

All the above localities, except that for *Prunus Padus*, which is in Westmorland, v.-c. 69, are in West Lancashire, v.-c. 60.

FROM THE COLLECTION OF GEORGE CROSFIELD THE YOUNGER (1785–1847).

Teesdalia nudicaulis Br. Upon the wall of the burying-ground near Hill Cliff, and upon a wall on the west side of the road betwixt Stockton Quay and the Stone Delph, 1808. "Hill Cliff is in Cheshire, v.-c. 58; perhaps the other locality also. Quarries in Lancashire and Cheshire are called 'delphs,' but not in Durham or Yorks to my knowledge," *J. A. W.*

Geranium sanguineum L. Blackpool. W. Lanc. v.-c. 60.

Alchemilla vulgaris L. Fields in Arpley, 1809. S. Lanc. v.-c. 59. This is var. *pratensis* Pohl.

Poterium officinale A. Gray. Brought by J. Kendrick from Haydock, 1808. S. Lanc. v.-c. 59.

Hippuris vulgaris L. Longford Bridge meadow, 1809. S. Lanc.

Hydrocotyle vulgaris L. In a lane near Bewsey Gates, 1808. S. Lanc.

Eryngium maritimum L. Seashore at Preesall, near Lancaster, 1808. W. Lanc. v.-c. 60. ("Probably now gone, although still fine on some parts of coast," *J. A. W.*); also plentiful at Bootle. S. Lanc. v.-c. 59. "Long gone from Bootle, but still occurs on S. Lancs. shores," *J. A. W.*

Valeriana dioica L. Near the new canal in Moore or Walton (Cheshire); also in a field by the brookside near Greston Heath, 1809.

Blackstonia perfoliata Huds. Brought by J. Kendrick from Speke, 1808. S. Lanc. "Still occurs sparingly," *J. A. W.*

Gentiana Amarella L. Brought from Speke by J. Kendrick, 1808. S. Lanc.

Calystegia Soldanella Br. Blackpool. W. Lanc.

Atropa Belladonna L., *Hyoscyamus niger* L. On the sea-coast at Poulton, near Lancaster, 1808. W. Lanc.

Veronica hybrida L. (labelled *spicata*). Yealand, 1811. W. Lanc. v.-c. 60. "There is an old record for this, 'near Silverdale, *Miss Beaver*,' which is the only note we have of it as a W. Lancashire plant. Yealand is in Dist. 3 of my *Flora*, and very near to Silverdale," *J. A. W.*

Bartsia viscosa L. Bartington, 1814. Cheshire, v.-c. 58.

Utricularia minor L. Whitrigg, 1820. Cumberland. Without personal authority in Top. Bot. for this county, v.-c. 70.

Pinguicula vulgaris L. Roadside near Carnforth, 1812. W. Lanc.

Lycopus europæus L. Ditches about Orford, 1808. S. Lanc.

Nepeta Cataria L. On the roadside from Lancaster to Warton, 1808. "I suppose this would be between Carnforth and Silverdale, W. Lanc., where it is still plentiful," *J. A. W.*

Scutellaria minor Huds. Bartington (Cheshire) and Lancaster Moor (W. Lanc.), 1814.

Galeopsis speciosa Mill. Cultivated fields in Sankey, 1808. S. Lanc.

Atriplex laciniata L. On the shore at Preesall, near Lancaster (W. Lanc.), 1808; on the shore near Baycliff, 1809. "Still at Preesall," *J. A. W.*

Parietaria ramiflora Moench. On the ruins of Furness Abbey, 1809; also on the wall of Addingham Churchyard in Low Furness. (Both S. Lanc. v.-c. 69.)

Epipactis palustris Crantz. Brought by J. Kendrick from Speke, 1808. S. Lanc. v.-c. 59. "We have never seen this off the sandhill tract in this district, and it is now probably lost at Speke," *J. A. W.*

Orchis mascula L. Near Whitley Reed, 1808. Cheshire, v.-c. 58.—*O. latifolia* L. Norton Marsh, 1810. Cheshire. Near Bewsey, 1810. S. Lanc.—*O. maculata* L. Speke, 1809. S. Lanc.

Eriophorum angustifolium Roth. Woolston Moss, 1809. S. Lanc.

Molinia cœrulea Moench. South shore, Liverpool, 1808. S. Lanc. "Now built over, but common in other places in this district," *J. A. W.*

Nardus stricta L. Near Frodsham, 1810. Cheshire. Found also on Lancaster Moor. W. Lanc.

Osmunda regalis L. Near Hill Cliff, 1809. Cheshire, v.-c. 58.

Ophioglossum vulgatum L. In Dunham meadows, 1811. S. Lanc.

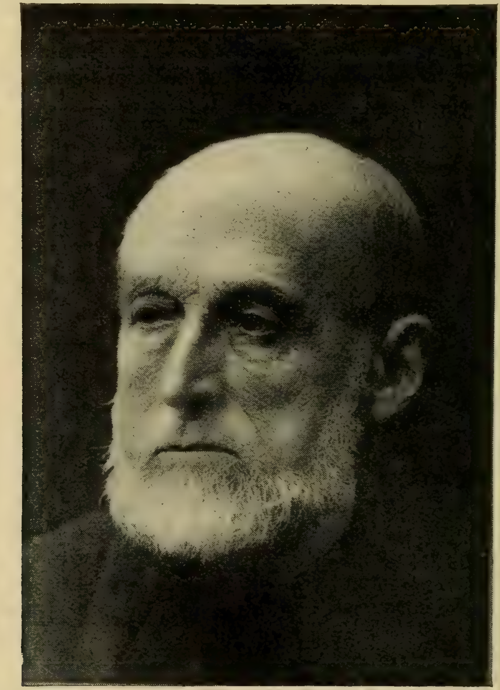
Botrychium Lunaria Sw. Near Ringway Chapel (Cheshire); near Wyersdale Meeting-house, 1829. W. Lanc.

JOHN PIQUET.

(1825–1912.)

John Piquet, pharmaceutical chemist, was born at St. Hélier, Jersey, on March 16th, 1825, and received his early education at one of the small private schools which existed at that time. Even at this stage of his career the retentive memory which made him so useful to his fellow-workers in botanical science made itself apparent. On leaving school at twelve years of age, he was apprenticed to Mr. John Ereaut, a pharmacist of St. Hélier, in 1837. After the termination of a five years' apprenticeship, he continued as assistant to his employer for a further period of five years. His working hours extended from 6.30 a.m. to 11 p.m., and he served the whole of his time without a holiday. The sciences upon which the art of pharmacy is based, however, provided him with the materials for his relaxation throughout a long life, and in Mr. Ereaut he found a kindred spirit, in that the love of nature was innate in both. Piquet began business on his own account at St. Hélier in 1847, and in this he maintained an active interest till his death on September 5th, 1912, in his 88th year. He was one of the oldest members of the Pharmaceutical Society of Great Britain, having been elected in June, 1853.

With the exception of his early training in pharmacy Piquet was self-educated, but he was an untiring reader and keen observer, and thus obtained a comprehensive knowledge of local natural history, and particularly of conchology, entomology, and botany. In botany his interest was chiefly centred on the flowering plants and ferns, although he made a collection of the seaweeds between 1855 and 1865, which he presented to the late Dr. Henri Van Heurck, of Antwerp, when the latter was collecting materials for the preparation of his *Prodrome de la Flore des Algues Marines des Iles Anglo-Normandes.* Of his collection Professor Van Heurck said:—" L'herbier algologique de M. Piquet a été fait avec grand soin, les localités y sont bien indiquées et on y trouve aussi un certain nombre d'échantillons de Mlle. White et d'autres collecteurs de Jersey." On the local flowering plants and ferns Piquet was the acknowledged authority, and was always pleased to accompany the many English botanists who at various times visited the island, and to give them every assistance. There are probably few of them who have not, during the last forty years, secured for their herbaria some of his beautifully prepared specimens.



In 1896 the Société Jersiaise, of which Piquet was a member, published his " Phanerogamous Plants and Ferns of Jersey "—a list containing seven hundred and twenty-one species, exclusive of varieties—which was followed in 1898 by a Supplement containing twenty-four species. With regard to the former of these its author stated that he had himself collected all the plants mentioned therein; Mr. Lester-Garland thus refers to it in his *Flora of the Island of Jersey* (London, 1903): " Mr. Piquet's list is an advance in some ways on the *Flora Sarnica* [of Babington]. Most of the imaginary species have disappeared, and it represents the results of fifty years' study of Jersey plants by a keen and intelligent observer." Piquet also largely supplied the account of Jersey plants in Ansted and Latham's *Channel Islands.* Mr. F. G. Piquet has been good enough to provide me with the following list of additions made by his father since the publication of Mr. Lester-Garland's *Flora*:—

Hydrocharis Morsus Ranæ L. Le Ouestnet, St. Brelade.

Carex filiformis L. Blanches Banques, St. Brelade.

Rumex rupestris Le Gall. La Rosière, Corbière.

Chenopodium urbicum L. St. John's Road, St. Hélier.

Mercurialis annua L. var. *ambigua.* Near First Tower.

Vaccinium Myrtillus L. Bonne Nuit Bay. Coll. by Father de Bellaing.

Chlora perfoliata L. Behind Gorey Castle. Very rare.

**Cuscuta Trifolii* Bab., **Glaucium corniculatum* Curt., **Erysimum cheiranthoides* L. St. Ouen's Bay.

Camelina sativa Crantz. Millbrook.

**Brassica campestris* L. St. Ouen's Bay.

Malva crispa L. St. Peter's Common.

**Valeriana pyrenaica* L. St. Ouen's Bay.

Symphytum tuberosum L. Near Parochial Cemetery.

Also the following records of plants stated by Mr. Lester-Garland to have been included among Jersey plants on insufficient evidence:—

Elymus arenarius L. Grouville Bay.

Scirpus pauciflorus Lightf. Near La Moye Quarries.

Chenopodium hybridum L., *C. rubrum L.* St. Hélier.

Dianthus deltoides L. Near Bouley Bay.

Ranunculus auricomus L. St. Ouen's Pond.

Geranium columbinum L. Behind Gorey Castle.

It was always with regret that Piquet saw any of the local plants disappear, usually through cultivation, and it was a favourite practice of his to cross over to the opposite coast of France, and to get seeds of the extinct plants and to re-introduce them. In this he was successful on many occasions. His last experiment in this connection was made with *Diotis candidissima*, which used to be fairly plentiful in St. Ouen's Bay, but had disappeared for many years. He procured seeds from Mr. Lynch, of Cambridge, started them in pans in his garden, and when they had sufficiently developed, he planted them out in their old locality. Two months before his death he was shown a small specimen from the Bay, and his delight was so great that, although unable to walk, he drove out to see it. He had become very feeble during the last eighteen months, but he was as keen and bright as ever. At eighty-six he still bathed in the open sea in the summer months—a practice of which he was always a staunch supporter, being one of the founders of the Jersey Swimming Club.

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* The plants marked thus were collected by Mr. Dancaster.

Some years ago he presented a comprehensive herbarium of the local flora to the Société Jersiaise, and in his will he left another to the Victoria College (Boys' Grammar School), and a third to the Jersey Ladies' College. His own herbarium was left to his son, Mr. F. G. Piquet, pharmacist, of St. Hélier, to whom I am indebted for most of the particulars contained in the foregoing sketch.

His engaging personality will, I believe, be always impressed on those of his brother botanists who had the good fortune to come into contact with him, for his smile of affectionate greeting ever went to the heart of things.

P. É. F. Perrédès.

SHORT NOTES.

Rubus glareosus, sp. nov. (p. 309).—I am indebted to Mr. W. P. Hiern for directing my attention to a rather serious omission in my article on "A New British Rubus." In accordance with Article 36 of the Rules for Botanical Nomenclature, my paper, in order to make its publication of the species "valid," should have contained "a Latin diagnosis" of the species: this I now supply. It has been drawn up at my request by the Rev. E. S. Marshall, who first showed me living bushes of the bramble in 1890, and has been associated with me ever since in the occasional study of it:—

Rubus glareosus, sp. nov. *Caulis* elongatus arcuato-prostratus, *obtuse vel acute angulatus*, pruinosus, in locis apricis triste purpurascenti-ruber, pilis brevibus confertis, tuberculis irregulariter sparsis, necnon glandulis stipitatis aculeolisque inæqualibus sed plerumque brevissimis *dense vel subdense indutus*, hinc inde in faciebus aciculo glandulifero prædictus. *Aculei numerosi, validiores ac subæquales, basibus magnis compressis, vix nisi ex angulis orti. Folia* ternato-quinato-*pedata* (quinata perpauca); ternatorum folioli laterales gibbosi vel profunde fissi. *Folioli angusti obovati superne opaci* subglabri, inferne pallidiores et in nervis pubescentes; petioli armatura atque indumento cauli similes; petioluli cum costis mediis aculeatissimi. *Foliolus terminalis* petiolulo suo subtriplo longior, *in apicem longum sensim acuminatus*, supra medium usque ad *basin integram subcuneatam* gradatissime attenuatus; dentes acuti vel acuminati, supra medium folioli plerumque plus minus compositi, inferiores pæne integri. Stipulæ angustæ, lineares vel lineari-lanceolatæ, dense glanduloso-ciliatæ. *Panicula laxa*, superne pyramidalis subracemosa, vel magis composita vagula truncata, *demum præsertim ultra-axillaris*; bracteæ summæ elongatæ angustæ profunde fissæ, folio uno alterove ovato integro supposito; rami inferiores racemoso-corymbosi, in plantis robustioribus paniculas secundarias simulantes, erecto-patentes vel patuli. Rachis pedunculique tomentoso-hirsutissimi, *glandulis nigrescentibus confertissimis valde inæqualibus stipitatis* at *pube plerumque obtectis*, aciculis nonnulis glanduliferis aculeisque numerosis gracilioribus declinatis vel curvulis induti *setulas* *tamen nunquam gerentes. Sepala attenuata*, externe ut in rachide vestita, margine albo angusto excepto virescentia, juniora laxe reflexa, serius suberecta fructumve amplectentia. *Petala* pallide rubella *angusta* distantia, *basin apicemque versus eximie attenuata.* Stamina demum rubella, mox erecta stylosque rubros arcte cingentia.

I am glad to be able to add that Mr. Marshall has given his consent to the suggestion which I now make, that this bramble shall take its place in our list as *Rubus glareosus* Rogers & Marshall.—W. Moyle Rogers.

Specific Names ending in "-oides."—In connection with the Linnean herbarium I have lately been engaged in drawing up a list of genera and species established by Carl von Linné. It is well known that Linné was inconsistent in his use of capitals, so I was obliged to investigate certain matters. Admitting that old, that is, pre-Linnean, generic names should be spelled with an initial capital, my task was to find out how many of the specific names ending in *oides* employed by Linné were old genera, and therefore to be capitalised. In Linné's *Critica Botanica* we have a list of one hundred and five genera condemned by him for ending in *oides*, but though he strongly reprobated the use of that ending for genera, he often used it himself for "trivial" names. We find he often used it when comparing the facies of a plant with another genus, not seldom his own genus, as, for instance, *helenoides*, *mimosoides*, *bryoides*, *proteoides*, and the like. After careful consideration of all the occasions concerned, I have come to the conclusion that the following are all that we are justified in printing with a capital letter, for in many cases it is doubtful whether the old genus is referred to, or whether it is only an adjective of resemblance:—

Agrimonoides (*Agrimonia*)
Aloides (*Stratiotes*)
Alyssoides (*Alyssum*, *Clypeola*)
Alaternoides (*Cluytia*)
Amaranthoides (*Axyris*)
Ammoides (*Seseli*, *Sison*)
Asteroides (*Conyza*, *Matricaria* ?)
Capnoides (*Fumaria*)
Ceratoides (*Osyris*)
Conyzoides (*Ageratum*, *Erigeron*)
Coralloides (*Clavaria*)
Echioides (*Cerinthe*, *Lycopsis*, *Onosma*, *Picris*)
Ficoides (*Cacalia*)
Hieracioides (*Picris*)
Hypericoides (*Ascyrum*)
Lathyroides (*Orobus*, *Vicia*)
Leontopetaloides (*Leontice*)
Malacoides (*Malope*)
Nymphoides (*Menyanthes*)
Polygonoides (*Calligonum*)
Rhagadioloides (*Crepis*, *Hyoseris*)
Rhamnoides (*Hippophaë*)
Scorpioides (*Ornithopus*)
Sesamoides (*Reseda*)
Sicyoides (*Cissus*)
Telephioides (*Andrachne*)
Tithymaloides (*Euphorbia*)

Possibly the most strange-looking of capitalised initials is *Myrrhis Odorata*; *Odorata* being the genus of Rivinus for the plant.—B. Daydon Jackson.

New West Australian Plants (p. 286).—I note your expression of regret at having published descriptions by Mr. Fitzgerald of species already published by Dr. White and myself.

No apology was necessary, and it seems to me a very minor matter as to whose name shall stand as the authority for a species, so long as the plant is described, the species is valid, and the description sound. Possibly the circumstances under which this overlapping arose may be worthy of mention. Early in 1907 Mr. Fitzgerald visited the Melbourne Herbarium, and as he was interested in the West Australian Flora, he was given for examination a number of plants chiefly from that district, which had been placed on one side for further examination. To these plants manuscript names were attached, but Mr. Fitzgerald left before any detailed examination or description of them had been made. I wrote repeatedly asking that the work of examination should be completed and the new species published, and finally after due notice had been given the material in question was examined in detail by Dr. White and myself. Certain of the manuscript names were found to be attached to valid species, but in other cases it was found possible to refer the plants to species or varieties already described. The valid species were then described; to avoid possible confusion the manuscript names were used and Mr. Fitzgerald's name mentioned in each case as the author of the manuscript name. As the later descriptions published in the *Journal of Botany* are given with a Latin diagnosis, these might stand for the species according to the strict interpretation of the Vienna Rules, but at the same time these Rules are expressly intended to discourage what is an ever-present danger, namely, the promiscuous bestowal of manuscript names upon imperfectly examined material, a practice which is apt to retard progress instead of advancing it.—ALFRED J. EWART.

PARNASSIA PALUSTRIS L. VAR. (OR FORMA?) CONDENSATA (p. 254).—I have known this curious maritime plant since 1877, having traced its course frequently all along the Lancashire and portions of the Cheshire coast sandhills. While fully agreeing with Messrs. Travis and Wheldon as to its strange appearance and apparently distinct physiognomy, I would consider it a *form* rather than a *variety*, for the following reasons. Early in the eighties, just before building operations were commenced on the coast-line between Lytham and Blackpool, that have culminated in the thriving township of St. Anne's-on-Sea, it occurred to me to make a botanical survey of the whole area. Here grew the *Parnassia*, as "*condensata*" as at Birkdale and Ainsdale, on the other side of the estuary of the Ribble; but I found every gradation, from the dwarfed specimens hardly an inch high, to the very robust and thickly caulescent plants. It was next traced further inland, where it assumed the normal state. Specimens preserved in my herbarium attest to this. It seems to me, therefore, that until it is proved by cultivation that this interesting plant maintains its peculiarities, it should not be considered as more than a form. I endeavoured to propagate it, and grew it for some time, but it eventually died off, with no satisfactory result. At Lytham, the oases between the sandhills were even more prolific of botanical wealth than those further south, although the rare *Erythræa* were not so dominant. I never saw the *Pyrola maritima* Kenyon so plentiful or luxuriant elsewhere, and I imagine the same causes conduce to the stout growth of this plant likewise, and that it would revert back to type if it could be properly cultivated. Other species, e. g. *Monotropa*, also occurred here, and appeared out of the normal line also. It is to be regretted that these most attractive Lytham sandhills have nearly ceased to exist; but it is to be hoped that those between Birkdale and Formby may yet remain to give delight to future lovers of nature. —J. COSMO MELVILL.

ARABIS HIRSUTA Scop. VAR. GERARDI Bess.—Having occasion to send Prof. L. Corbière, of Cherbourg, a bundle of plants, I included an example of *Arabis hirsuta* queried as the above variety. I have recently received his verification of the naming and wish to call the attention of others to the variety, which is described in Corbière's *Nouv. Fl. de Normandie*, p. 46 (1894), as follows:—"*β. A. Gerardi* Bess. Diffère seulement de *A. hirsuta* par ses feuilles caulinaires auriculées-*sagittées* à la base; siliques plus grêles, atteignant jusqu'à 5–6 cm.; graines plus visiblement ponctuées." My specimens were gathered near Headley, Surrey, in 1889, and the plant may prove to be not uncommon in other localities.—C. E. SALMON.

BOTRYCHIUM LUNARIA IN HERTFORDSHIRE.—I cannot see that this plant is on record for v.-c. 20 in *Topographical Botany* or in Mr. Bennett's Supplement (1905). In the Memorials, Journal, &c., of C. C. Babington (1897), p. 234, we read:—"1882. June 7. We went with Professor and Mrs. Cowell to Mr. Pollard's, at High Down, near Hitchin. We found *B. Lunaria* for the first time in Herts."—C. E. SALMON.

ERICA CINEREA L. VAR. SCHIZOPETALA (p. 314).—Mr. G. C. Druce kindly calls my attention to a record by himself (Journ. Bot. 1902, p. 352) of a form of *Erica cinerea* L., found by Mr. Dickenson, at Edenbridge, Kent, which appears from Mr. Druce's brief description to have been identical with that described by me.—G. S. BOULGER.

EUONYMUS EUROPÆUS WITH WHITE FRUIT.—This autumn I have found two good-sized bushes of this species on which all the fruits, instead of being rose-coloured, were pure white. The capsule had a similar fleshy substance and the aril around the seed retained its brilliant orange colour. The bushes grew in company with others, bearing ordinary fruits, on the bank of the Malago, a small stream that flows through Crox Bottom and the city of Bristol into the river Avon, North Somerset. This albino form does not seem to be mentioned in books, and, occurring as it does in the fruit, is worth notice.—IDA M. ROPER.

FRUIT OF EUONYMUS.—I have just been sent from the neighbourhood of Guildford, Surrey, a branch of the Spindle-tree bearing cream-coloured fruits, the aril being of the usual orange colour. This colouring makes a pleasing contrast, though not so effective as the normal tint. I have never heard of an albino form of this fruit before.—ELEANOR ARMITAGE.

[The form though unusual is by no means unknown: Withering (1776) says: "Fruit purplish, sometimes white."—ED.]

ISLE OF WIGHT PLANTS.—While in the Isle of Wight early in October last I noticed *Geranium rotundifolium* L. growing in some plenty in a lane at Alverstone, near Sandown. This species is recorded for the neighbourhood of St. Lawrence only, in the *Flora of Hants*, ed. 2. I also remarked on St. Boniface Down an abundance of *Ulex minor* Roth, the only localities for which in the Isle of Wight given in the flora are St. Helens Spit, Sandown, and Shanklin.—H. W. PUGSLEY.

YET another plant may be added to the Flora of the Isle of Wight, and also as a fresh record for Hants. In a letter received from Mr. C. E. Salmon he writes: "Did I tell you of *Herniaria hirsuta* in very small quantity on old wall near St. Lawrence, *Miss Tulk*, 1910? I have seen specimen." There is no record of its having been seen in Hants since 1881.—FRED. STRATTON.

MEDICAGO TRIBULOIDES Desv. (p. 350).—Mr. Salmon points out that he recorded this for Shoreham in Journ. Bot. 1909, p. 21.

REVIEWS.

A Manual Flora of Egypt. By Dr. RENO MUSCHLER. With a Preface by Prof. PAUL ASCHERSON & Prof. GEORG SCHWEINFURTH. Two vols. Cloth, 8vo. Pp. xii. 1312. Berlin: Friedlander & Sohn. 1912. Price £2.

ALTHOUGH the flora of Egypt has been specially studied by several botanists of high reputation, a work like the present has long been badly wanted. Modern research has robbed Forskål's *Flora Ægyptico-Arabica* and Delile's *Floræ Ægyptiacæ Illustratio* of much of their original usefulness; and though the remark does not apply to the lists published from time to time by Professors Ascherson and Schweinfurth, those lists are accessible neither to student nor traveller, nor do they give the descriptive information desired by both. Boissier's *Flora Orientalis* goes over some of the gronnd, it is true; but besides being very costly, it contains a great body of facts superfluous from the present point of view. There remains virtually only Post's *Flora of Palestine* which, though it may be helpful in Egypt, is as likely as not to fail in clearing up some doubtful identification. We have therefore been anticipating with pleasure the appearance of the present book, and now that it has come to hand, are glad to know that, in its case, reality comes fully up to expectation.

The plan of the work will be familiar to anyone who has used the colonial floras issued from time to time in this country. After the definition of the Natural Order, to which is appended a short account of its properties and uses, a key to the genera is given, and then under every genus a clavis of its species, followed by a detailed description of each, with its distribution and vernacular name or names. All this is excellently done, the descriptions, while thorough, being clear and not too long. The arrangement, it should be noted, is that of Professor Engler's *Synopsis*.

Several appendices add to the book's value: thus we have a short history of botanical discovery in Egypt; an informing essay on the phytogeography and geology, including climatology, of the country; a tabular view of the distribution of Egyptian plants; a list of species commonly cultivated; and a glossary of technical terms. As regards phytogeography, five botanical regions are recognized: the Mediterranean Coast Region; the Nile-Delta Region, with four Sub-regions; the oases of the Libyan Desert; the Desert Region, also with four Sub-regions; and the Region of the Red Sea.

In their preface Professors Ascherson and Schweinfurth state that Dr. Muschler's list is not quite complete, some recorded species having been overlooked. Without going more deeply into the matter than opportunity allows, we cannot say to what extent this remark applies.

In writing the book our own language has been preferred to French, the result being on the whole satisfactory, though the text would have been improved here and there had the sheets been revised by an English botanist. A little more care in correcting the proofs, too, would have been advisable; we allude especially to the various ways in which the titles of works are quoted and the names of authorities for species given; in ten cases also the authority for the genus has been omitted. We should like to have found an introductory key to the Natural Orders, and a short prefatory statement relating to the botanical regions, for it is somewhat disconcerting to be faced with a long string of leaded letters indicating those regions, and to have to go for an explanation nearly to the end of the second volume. These criticisms which, after all, deal with matters easily to be rectified in a second edition, are framed in no carping spirit; but the work is so good that it would be a pity not to indicate the few points where it misses the perfection at which the author has aimed. Anyway, this is undoubtedly *the* flora of Egypt, and it is to be hoped that the demand for it, both here and in America, will prove that Dr. Muschler's confidence in choosing as its vehicle the common mother-tongue has not been misplaced.

S. M.

Prodromus Floræ Britannicæ. By FREDERIC N. WILLIAMS. Part 10 (pp. 533–604). C. Stutter, 110 High Street, Brentford. (Price 3*s*. 4*d*.)

THE tenth part of Mr. Williams's interesting Flora is preceded by a note on the inner side of the wrapper (which we hope will be reprinted in a place less likely to be lost when the volume is bound) in which he pays a high tribute to the usefulness of the British Herbarium in the Department of Botany: "In association with the special library, consisting of books, pamphlets, MSS., and plates, dealing exclusively with British Botany, this separate Herbarium is indispensable for the critical study of British plants." Mr. Williams also mentions the special British collections at Kew, as well as the specimens incorporated in what he terms "the National Herbarium"—a name more usually bestowed on the British Museum collection.

The part includes the completion of the *Euphorbiaceæ*, and the orders *Malvaceæ*, *Tiliaceæ*, *Elatinaceæ*, *Hypericaceæ*, *Cistaceæ*, *Frankeniaceæ*, *Violaceæ*, *Resedaceæ*, and *Droseraceæ*—all small orders, but including some of the more interesting British plants. We have more than once paid tribute to the unusually interesting nature of Mr. Williams's book; no other contains anything like the same amount of information as to the history of our species, and the extracts from numerous early and recent works of widely different character show a wide range of reading. This being so, the absence of any such reference in the case of *Euphorbia hiberna* is somewhat remarkable; its poisonous properties were known to Threlkeld and the older writers, and form the subject of an interesting note by H. C. Hart in this Journal for 1873 (p. 339)—see also Journ. Bot. 1912, 125; we note by the way that the specimen in Herb. Mus. Brit. from near Dungarvan, Co. Waterford, collected by the present writer in 1880, which extended the range of the species in an easterly direction is not among those cited. The citation of "*E. peplos*" from Linn. Sp. Pl. 456 is somewhat puzzling, as the name—the old generic title—there stands as *Peplus*.

The treatment of species is as usual original, and will not always, we think, command general acceptance—*e. g.* in the placing of *Hypericum undulatum* under *H. quadrangulum* as a variety, in which however Mr. Williams follows Choisy in DC. Prodr. i. 548 (1824). He retains Spach's genus *Tuberaria* for *Helianthemum Breweri*, under which he places the Anglesea and Irish plants, assigning the Jersey *H. guttatum* Miller to *T. annua* Spach. Mrs. Gregory's *Viola calcarea* he relegates to its former position as a variety of *calcarea*, and points out that, if the plant be considered a species, it must stand as *V. parvula* Opiz (1823): Mr. C. E. Britton's interesting study of the variations of this species (published in this Journal for 1904, pp. 141–144) is presented in tabular form. Mr. Wilmott's conclusions as to the application of the name *Viola canina* are not accepted, and his paper is not referred to. The part presents ample matter for careful study, and the work is indispensable to those interested in the history of British plants.

Die Palæobotanische Literatur. Compiled by W. J. Jongmans. Vol. ii. pp. 417. Price 18 Marks. Jena: Gustav Fischer.

This volume contains a list and analysis of the literature on palæobotanical subjects published in the year 1909, together with a considerable number of additions to the former volume, which dealt with the work of the year 1908. The size of the present part is much larger than that of its predecessor, the plan remaining the same. In the first portion a list of some four or five hundred papers is given, and this is followed by a systematic review of every plant described or discussed in them. It is thus easy to find out practically everything that has been published about any particular species or subject during the year. The scope of the work is very wide, including many papers on modern plants allied to ancient types. A large number of references are given to papers dealing with the difficult subject of Quaternary Plants, which is of such great importance in the study of geographical distribution, plant associations, and other topics, and which claims so few workers in this country. A series of volumes like the present one would simplify research considerably, and, since the labour of producing it must be enormous, it is to be hoped that botanists will support it in a practical way.

H. H.

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on Nov. 7th, Dr. R. R. Gates read a paper "On Mutating Œnotheras," in which the following facts and views regarding mutation as an evolutionary factor were referred to:—

1. *Œnothera Lamarckiana* has probably undergone crossing in the wild state to the same extent that other open pollinated species intercross. 2. The mutation phenomena are an evidence of germinal instability resulting from crossing, change of climate, or cultivation. 3. Hybrid splitting is inadequate to account for the forms which suddenly appear. 4. Some of the mutants differ from the parent in their physiological adjustments, and this may account for cases of "climatic adaptation," but mutations will not suffice to explain the more complex adaptations which involve inter-relationships between several organisms. 5. *Œ. rubricalyx* has originated as a heterozygous mutant, but there are obvious difficulties in applying the same explanation to the other mutants of *Œnothera*. 6. The origin of certain of the mutations, at least (e. g. *Œ. lata*, *Œ. gigas*), is intimately concerned with chromosome mechanisms; that of certain others may be concerned with the action of releasing stimuli. 7. Darwinian natural selection always assumed an original environmental change for the organism, either (*a*) a change of climate in a given area, or (*b*) the introduction of new organisms, leading to the gradual modification of the species. 8. But neither chance-wise mutations in all directions, nor the vicissitudes of changing climates and distributions can account for the orderly phylogenies which larger groups of organisms frequently show. 9. There is no single evolutionary factor, but the process is a multifarious one.

At the same meeting a paper was read by Mr. Henry N. Ridley on a collection of plants from Mount Menuang Gasing, Selangor. Menuang Gasing is the most southern high point of the great chain of the granite mountains which form the backbone of the peninsula. The mountain is 4900 ft. high, and though there are other hills a little south of this, this is the highest and most likely to bear the high hill flora. The fauna was found to belong to that of high northern ranges, and the flora shows clearly that it corresponds. Among the characteristic plants found were *Impatiens oncidioides*, *Bucklandia populnea*, the rare *Polyosma parviflora*, *Pratia begonifolia*, *Dilochia Cantleyi*, and *Goodyera gracilis.* 143 species were collected by Mr. Kloss in February last, of which 14 were undescribed: of these the most noteworthy were what is probably the biggest species of *Oberonia*, a remarkable species of *Blastus*, and a new species of *Balanophora.*

The Central Committee for the Survey and Study of British Vegetation (British Vegetation Committee) have at present under consideration a scheme for the formation of a British Ecological Society in which the existing organization of the Committee would be merged. The widespread and increasing interest in Ecology that has lately been evident in this country has led to an opinion that the time has now come for establishing an organization which shall comprise and correlate so far as possible the whole of the ecological work that is being done in these islands. This was the original aim of the British Vegetation Committee (founded in 1904)—an aim that has met with a very large measure of success. The membership of the Committee has been strictly confined to active workers in plant-ecology, and its organization during the eight years of its existence has probably been the best calculated to attain its objects. But the recent rapid increase in the number of ecological workers has led to such a considerable enlargement of the Committee that its present organization, which includes a large number of "Associate-Members," already tends to become unworkable, and this tendency will certainly be accentuated with every year of its continued existence. It is felt that the organization of a Society with a regularly published and carefully edited journal might succeed in bringing the most scattered workers, many of whom are still outside the ranks of the Committee, into touch, and in keeping them informed of the progress of the subject. Such a Society might also perform a similar function for the many who are keenly interested in Ecology without themselves being active workers in the field. A full prospectus (from which the foregoing is an extract) of the proposed scheme may be obtained from Dr. W. G. Smith, of Braidburn Crescent, Edinburgh.

The latest part (October) of the *Proceedings* of the Linnean Society contains, besides the usual notices of meetings, obituaries, etc., matter of special interest in a series of headed "abstracts." The exact application of the term is not obvious. The first is a very interesting paper by Mr. A. O. Walker on "The Distribution of *Elodea canadensis* in the British Isles in 1909"; this appears to be given in full, and, the matter being of special interest to British botanists, we may be allowed to express regret that it should not have appeared in these pages, where it would have reached a larger number of them. Although professedly relating to 1909, the information given extends back to the earliest occurrence of the plant in Britain; we find no reference to Buckingham-shire, where, in or about 1867, it occurred in the canal at Aylesbury in such masses that it had to be removed in carts. The next "abstract" is a note on [Mr. Druce's] "exhibits on 16th November 1911," which should surely have appeared in its place in the account of the meeting, where, indeed, reference is made to it—"Phyllody in *Trifolium*" is so frequent and so generally known that the "abstract" relating to it was hardly worth printing. The fifth "abstract" on "The Palæographical Relations of Antarctica" occupies eleven pages; it would be interesting to know in what way this differs from a "paper," or why it is excluded from the Society's *Journal*. The most important and interesting of the contents is however the "Index to the Linnean Herbarium," prepared by Dr. Jackson, extending over 150 pages. This must form the subject of a future note.

Under the title *Nervation of Plants* (Williams & Norgate, 3*s*. 6*d*.) Mr. Francis George Heath, described as "the well-known author of *The Fern World*, *The Fern Paradise*, &c.," presents a volume which it is claimed "will be found of deep and absorbing interest to all intellectual readers." Mr. Heath has a facile pen and a limited knowledge of botany, apparently acquired from not always very up-to-date books and articles. "The word tissue," he tells us (p. 2), "is synonymous with fabric. It means, in this sense, the substance of which a plant is composed; and that substance is an aggregation of vessels." The liber or bast "is familiar to most people in the form of the long, narrow light brown strips used for tying plants. It varies much in different plants, but undoubtedly performs a most useful office as a soft lining to the rough outer bark, as a hard textured protection for the more delicate inner cells, and as a useful 'purveyor' of sap, which flows readily along its surface as well as through its thin walled cells. It therefore receives from the cambium at all points what that wonderful cylinder has to convey" (p. 67). The book is full of this sort of stuff.

Die Formen der Orchidaceen Deutschlands, Deutsch-Oesterreichs und der Schweiz, by Walter Zimmermann (Selbstverlag des Deutschen Apotheker-Vereins, Berlin), is a handy guide to the determination of the genera, species, varieties and forms of the Central European Orchids by means of a series of keys. Descriptions (in German) are given of each species; these are followed, in each case, by a key for determination of the variety or form, and by notes on the distribution of the species and its subdivisions. Sixty-eight species are included, and a large number of varieties and forms. We note that the author regards *Orchis* as masculine. The small size of the book, 6½ by 4½ inches and one-sixth of an inch in thickness, renders it a very portable aid to collectors of Swiss or German orchids.

Messrs. Methuen & Co. send us a handsome quarto volume (21*s*.) on *Japanese Gardens*, by Mrs. Basil Taylor, which owes much of its attractiveness to the twenty-eight pictures in colour, by Mr. Walter Tyndale, by which it is illustrated. The various aspects of Japanese gardening are dealt with in eighteen chapters, including two on garden folk-lore and legends and one on the flower festivals which form so characteristic a feature of Japanese life. Mrs. Taylor writes in a pleasing style, and her intimate acquaintance with her subject renders her book a trustworthy account of the gardens of Japan.

In the premature announcement of his death (see p. 296) Dr. M. C. Cooke has shared the fate of Mark Twain and, earlier, of Charles Waterton, both of whom had occasion to protest against their too speedy inclusion among the majority. The contradiction came to us just as we had read the circumstantial account in the October *Kew Bulletin* that Dr. Cooke "peacefully passed away at his residence" on Aug. 19. Thus is history written!

We learn from the *Kew Bulletin* that our sometime contributor Mr. I. H. Burkill has been appointed Director of the Singapore Botanic Gardens in succession to Mr. H. W. Ridley, whose retirement we announced on p. 176.

The preparation of the second edition of the *Biographical Index of British and Irish Botanists* is making rapid progress, and the compilers will be glad to receive any additions or corrections to the existing work. A list of names concerning which fuller information is especially desired may be obtained from either of the compilers—Mr. James Britten, 41 Boston Road, Brentford, Middlesex, and Mr. G. S. Boulger, 11 Onslow Road, Richmond, Surrey, where also all other information may be sent. It is proposed to bring the volume up to the end of 1912.

Messrs. Macmillan publish in the "Travel Series" issued by their New York House a very charming volume—*Among English Hedgerows*—written and illustrated by Clifton Johnson. The title, it must be confessed, is somewhat misleading, and those who expect to find in the volume an account of the trees which form our hedgerows and of the plants and other objects usually associated with them will be disappointed. Perhaps allowance must be made for transatlantic interpretations of words to which we attach a definite meaning, for it must be confessed that the frontispiece entitled "An English Lane" represents rather a fairly wide and open country road. Anyway, the book is well written and interesting, and there are numerous and admirable illustrations.

Mr. W. Lawrence Balls publishes in Messrs. Macmillan's "Science Series" a volume of studies in physiology and genetics in connection with *The Cotton Plant in Egypt*. After a brief historical sketch the author devotes a section to "the individual plant," its fertilization, cytology, and embryology, followed by its development and environment; "the race" is then discussed, from the standpoints of fluctuation, commercial varieties, natural crossing, and heredity; another section treats of "economics," and the book ends with a full bibliography and a good index. The book is illustrated by 71 figures and diagrams.

We greatly regret to announce the death, on Nov. 2nd, of Mr. Henry Groves, of whom some account will appear in an early issue.

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ERRATA.

P. 22, l. 13 from top, for "eriostrichus" read "eriotrichus."
P. 103, l. 21 from bottom, for "bee (bees)," read "Lee" (Lees).
P. 109, l. 14 from bottom, for "contributed to" read "prepared for."
P. 165, for "CALANDRINIA CREETHÆ Tratman" read "**Calandrinia Creethæ**" Morrison. P. 166, *Indigofera boviperda* should also be in black type. See p. 275, footnote.
P. 176, l. 15 from top, for "H. W." read "H. N."
P. 225, footnote. See correction p. 260.
P. 234, l. 19 from top, for "*didyma*" read "*gemina*."
P. 239, l. 20 from top, dele "mighty."
P. 296, dele "Dr. Mordecai Cubitt Cooke": see p. 384.
Pp. 316, 317, *passim*, for "Pearsell" read "Pearsall."
P. 320, l. 29 from bottom, omit "Weekes."
P. 345, l. 22 from bottom, for "2176" read "2199."

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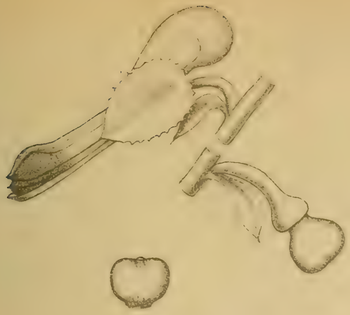

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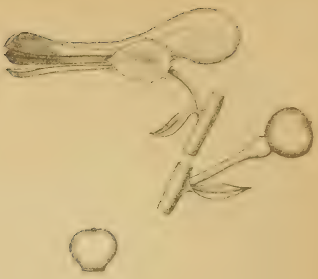

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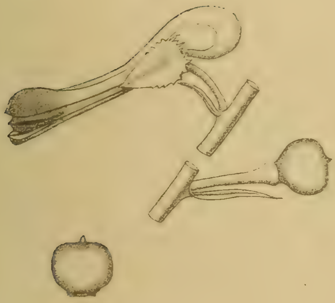

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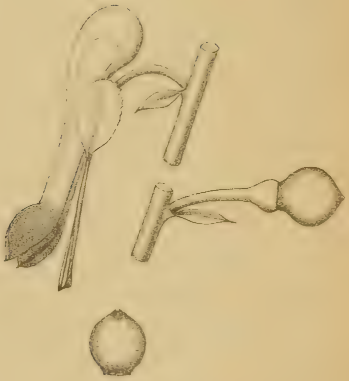

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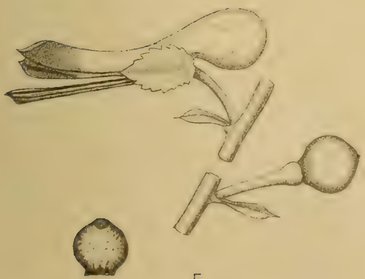

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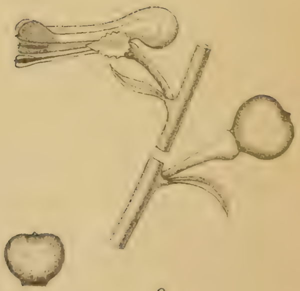

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THE GENUS *FUMARIA* L. IN BRITAIN.

By H. W. PUGSLEY, B.A.

The following account of the British *Fumariæ*, written mainly during the winter of 1910–11 but delayed in completion, is a continuation and summary of the papers published in the *Journal of Botany* in 1902 (vol. xl. pp. 129 *sqq.*) on "The British Capreolate Fumitories," and two years later (vol. xlii. pp. 217 *sqq.*) on "A New *Fumaria*." In the first of these articles it was shown how an apparently endemic species, *Fumaria purpurea*, had been wrongly identified with *F. Boræi* Jordan, while the true plant had become inextricably confused with that author's *F. confusa* and the *F. muralis* of Sonder. In the second paper the fine Cornish Fumitory allied to the Spanish *F. agraria* Lagasca was described as a new species, *F. occidentalis*.

I regret it has not been possible for me to examine the *Fumaria* material in the great Continental herbaria, but since the publication of these papers the Fumitories in the majority of British collections have passed under my observation, and various botanists have made large gatherings in the field, with the result that much fresh information has been accumulated, and some entirely new forms discovered. Meanwhile, valuable additions have been made to the general collection available for reference at the British Museum.

To describe these new forms and review the genus as represented in Britain in the light of recent work is a principal object of the present paper.

The earliest work devoted to the Fumitories, so far as I am aware, is Handschuch's *De Plantis Fumariaceis*, published at Erlangen in 1832, in which four species of *Fumaria* are described, viz. *F. capreolata* L., *F. officinalis* L., *F. Vaillantii* Lois., and *F. parviflora* Lam. A few years later these plants attracted the notice of British botanists. In 1840 Babington read a paper respecting them before the Botanical Society of London, and Arnott published an independent account of the British forms in the *Proceedings of the Botanical Society of Edinburgh* (pp. 99–108).

In 1844 Parlatore produced a monograph of the *Fumariaceæ*, with descriptions of ten species of *Fumaria*, and in the years that immediately followed a number of forms were described on the Continent under fresh specific names—chiefly by Jordan, who dealt with French plants, and Boissier, whose specimens were obtained from various countries bordering on the Mediterranean.

This increased knowledge of the Fumitories was summarized in 1854 in an admirable monograph published at Lund by the Swedish botanist, Hammar, of which a Latin edition was issued from Upsala three years later.

This monograph furnishes a comprehensive survey of the development of our knowledge of the genus, which it classifies (after excluding *Platycapnos* Bernhardi) by a primary division into three sections, based on the form of the corolla. These sections are: (1) *Officinales*, in which the keels of the outer petals are surrounded by broad, spreading wings reaching the apex, with the inner petals broad and but little curved; (2) *Capreolatæ*, in which the margins of the upper petal are reflexed, and those of the lower one very narrow and erect, in neither case reaching the apex, while the inner petals are narrow and more or less curved upwards; (3) *Agrariæ*, where the margins of the upper petal are broad and patent-reflexed, and those of the lower one of medium width and spreading, in both cases extending to the apex, with an upward curving of the inner petals. The number of species described under these sections is twenty-four, in addition to which are several varieties. A fairly satisfactory figure of the flower and fruit of each species, and of some of the varieties, is appended to the monograph.

In 1859 there appeared in the *Transactions of the Linnean Society* (vol. iv. pp. 157 *sqq.*) a second paper by Babington on these plants, which formed the basis of their arrangement in British botany till my revision of the *Capreolatæ* in the *Journal of Botany* for 1902. Between these dates no further attention seems to have been given to the genus in Britain, while abroad little was published till a second monograph was produced in 1873 (in *Flora*) by the German botanist Haussknecht.

In this monograph not only *Platycapnos* but *Petrocapnos* Coss. (in Bull. Soc. Bot. Fr. ii. p. 305) is excluded from the genus; but such species as had been established since the date of Hammar's work are incorporated, and five more are published for the first time, with the result that, after changes of status in the case of several forms, the total number of species becomes thirty-three.

The arrangement of the species differs essentially from that of Hammar, the genus being first divided into two sections only, viz. *Angustisectæ*, having leaf-segments linear or linear-lanceolate, always longer than broad; and *Latisectæ*, with broader, more ovate leaf-segments, not much longer than broad. Each of these sections is subdivided into three classes, the *Angustisectæ* into *Officinales*, *Parvifloræ*, and *Latisepalæ*, from the types of *F. officinalis*, *F. parviflora*, and *F. micrantha* respectively; and the *Latisectæ* into *Murales*, *Capreolatæ*, and *Agrariæ* after the types of *F. muralis*, *F. capreolata*, and *F. agraria*. As will be shown later on, the views adopted respecting several of the species diverge materially from those of Hammar.

Since the publication of Haussknecht's monograph further additional species have been described, to the number of nine, so far as I can ascertain, exclusive of forms either recognized as hybrids or subsequently reduced to the rank of varieties. Of these, one is from Morocco, one from Spain, one from Italy, three from Sicily, one from Transsilvania, and two (my *F. purpurea* and *F. occidentalis*) from Britain.

It is noteworthy that in a monograph of the Italian *Fumariaceæ*, published at Florence in 1897 by L. Nicotra, the author has reverted to Hammar's subdivisions of the genus, but with the section *Officinales* placed after the *Capreolatæ* and *Agrariæ*.

It will thus be seen that *Fumaria* must be regarded as a polymorphic and critical genus of plants, concerning which monographers have shown considerable differences of opinion in the grouping of the species. Indeed, as in some other critical genera, it seems more difficult to define satisfactorily the groups of forms than to describe these individual forms as species irrespective of their allies.

The best and most natural classification on the whole, although it is not free from objections, seems to be that of Haussknecht, in adopting which I have enlarged his definitions in the hope of making them more exact; and, as his sequence of species has not been generally followed in recent Floras, I place the *Latisectæ* before the *Angustisectæ*, and begin with the *Capreolatæ*, after the example of Nicotra's monograph, and Rouy & Foucaud's *Flore de France* (vol. i. p. 171). This order has the further incidental advantage of necessitating the least change from that of our present British text-books.

It may be well to recur briefly to the necessity of exercising judgement in the collection and examination of specimens. With nearly all the species the habit and foliage vary exceedingly according to surrounding conditions—so much so that, although they are generally distinctive, I cannot always readily recognize as specific characters the features attributed to them in some of the Continental Floras. It is of the first importance throughout the genus that normal flowers, fully coloured and with the corolla-wings developed, should be obtained. It is a remarkable characteristic of the Fumitories—especially the *Latisectæ*—that when they grow under unnatural or starved conditions the corolla fails to develop and tends to revert to a small primordial form, whitish in colour, except for the green keels of the two outer petals, and with the wings of these two petals obsolete. Such corollas are useless for the determination of species. A corresponding degeneration, however, does not take place in the calyx, which, while variable within certain limits, I believe nearly always maintains its essential characters; and the same may be said of the fruits, except that sometimes, in the case of weak or exhausted plants, they may not reach their ordinary dimensions. The form of the pedicels and their bracts is also important, as well as the length of the peduncles bearing the racemes of flowers. A curious feature of the corolla in *Fumaria* is the dispersion or "running" of the purple colour of the apex after fertilization and as the flower fades.

The form of the corolla-tube and the wings or margins of the outer petals, as well as the fleshy base or neck of the fruit, should always be noted before specimens are dried, as these features become obscured in the process of pressing. And a screw-press should be used with caution, as, with too great pressure, the form of the whole flower is easily destroyed and the fruit smashed. It is also desirable, when mounting specimens, to collect those fruits which inevitably become detached within a cardboard frame enclosed in a small envelope. If the fruits are not collected they will certainly break away from the pedicels by degrees and disappear, and if they are simply placed in an envelope with no protection, they are often crushed in the herbarium in the course of a few years by the weight of the superincumbent sheets; and for want of these precautions many valuable specimens have been ruined.

In Britain all the species of *Fumaria* are primarily weeds of cultivated ground. Owing to our moist climate they are not especially flowers of spring, as in the Mediterranean region, but may be found in suitable localities at any time from April till October, according to the tillage of the ground. Early in the season cornfields often produce good specimens, and in the autumn the most likely places are fields of potatoes and other root-crops.

With regard to the comital distribution of these plants in Britain, an attempt has been made to revise the lists in the case of the large-flowered species, as it became evident, on the examination of herbarium material, that little reliance could be placed on the records whereon the lists in *Topographical Botany* and its Supplement have been founded. I have therefore drawn up fresh lists taken from specimens that have actually come under my notice. These lists were utilized for the tenth edition of the *London Catalogue of British Plants*; they have since been supplemented, and, although they are undoubtedly still incomplete, the additions are not likely to be numerous.

In perusing these lists it cannot fail to be observed that very many of the records are from the same districts, particularly Cornwall and Devonshire, North Wales, Mid Scotland, and the Orkneys. The prevalent geological formation of these regions—where the large-flowered Fumitories have their headquarters with us and the different species are often seen growing intermingled or in close proximity—is the old Red Sandstone; and I believe that in Great Britain these plants are as characteristic of that formation as *F. parviflora* and *F. Vaillantii* are of the chalk. The affection of the large-flowered Fumitories for the old Red Sandstone in this country does not appear to have hitherto been remarked.

The distribution of the *Fumariæ* in Ireland has been carefully revised by Mr. Lloyd Praeger in the *Irish Naturalist*, vol. xiv. pp. 156 *sqq*. (1905).

As the different species of the large and small flowered groups are often met with in company in the old Red Sandstone and chalk districts respectively, it might be expected that hybridization would frequently happen. In my experience, however, this is not so. I have on rare occasions met with isolated plants, entirely or nearly barren, that are evidently hybrids between species growing in more or less abundance around them. But I have never seen intermediate forms varying between different associated types with the appearance of hybrid origin except in one or two uncertain instances that will be dealt with in detail under the respective species. It is noteworthy that in all the cases of hybridity that I have recognized one of the factors has been *F. officinalis*.

The measurements appearing in this paper are taken from dried specimens unless otherwise stated, and in the case of the floral organs refer to average fully developed flowers. It may be remembered that the fruits, when dried, are slightly shorter than when fresh, owing to the shrinkage of the fleshy base.

The foreign distribution is taken mainly from Haussknecht's monograph.

The specimens quoted as Exsiccata are to be found in the Herbarium of the British Museum, except where the contrary is stated.

The sign ! implies that I have seen specimens from the localities so marked. Where the sign ! ! appears, I have gathered the species *in situ*.

FUMARIA *L.*

(As restricted by Haussknecht, including only *Sphærocapnos* DC. Syst. Veg. ii. p. 131.)

SECTION I. GRANDIFLORÆ (LATISECTÆ of Haussknecht).

Leaf-segments flat, from oval to lanceolate in outline, never so narrow as linear, at least in the case of any British species. Flowers normally larger than those of *F. officinalis* L., exceeding 9 mm. in length. Upper petal (in good flowers) with margins or wings reflexed upwards. Lower petal with margins or wings little, if at all, dilated towards the apex. Inner petals more or less curved upwards.

Subsection 1. Capreolatæ.

Peduncles relatively long. Pedicels usually much thickened towards the tip, and (in British species) rigidly recurved in fruit. Bracts (except in *F. flabellata* Gasp. and *F. gaditana* Haussk.) about as long as the fruiting pedicels. Sepals large, generally entire towards the apex, at least as broad as the corolla, and not less than one-third of its whole length. Fruit very obtuse and obscurely keeled (except in *F. macrosepala* Boiss. and *F. montana* Schmidt), and when fresh (at least in the British species) with a distinct fleshy neck, which is narrower than the dilated lip of the pedicel.

The plants placed here by Haussknecht form a comparatively well-marked group, notable for their large sepals and usually long-peduncled racemes. *F. flabellata* Gasp., however, in the form of its corolla, and *F. macrosepala* Boiss. in its fruit, mark a transition towards the *Agrariæ*, while *F. gaditana* Haussk. shows a general approach to *F. muralis* Sonder.

1. Fumaria capreolata L.

At the time of writing on this plant in 1902 (see Journ. Bot. p. 131) I pointed out that the form inhabiting the Channel Islands differed from that prevailing in Britain. Not questioning the identity of the latter with the European *F. capreolata* L., as generally understood, I proceeded to show that the former was practically the same plant as *F. speciosa* Jord., which name I proposed to adopt in a subspecific sense. The examination of further material has since induced me to modify this view.

F. capreolata was first published in *Species Plantarum*, ed. 1, p. 701, the species being founded on Bauhin, Pin. 143 (1623), and Ray, Hist. i. 405 (1686). No specimen of the plant intended exists in the Linnean Herbarium, but Linnæus remarks of it, "Habitat in G. Narbonensi, Anglia. Pedunculi partiales recurvati sunt."

The form frequent in the South of France, which has coloured flowers and is supposed to be the plant of Bauhin, was described as a distinct species, *F. speciosa*, by Jordan in his *Catalogue of Grenoble Plants* (1849); and five years afterwards in Schultz's *Archives* (p. 305) this author proposed to designate the pale-flowered French form *F. pallidiflora*, abandoning the Linnean name *F. capreolata* altogether. In this he was followed by Babington, who, in Trans. Linn. Soc., identified also the British form with *F. pallidiflora*.

The Linnean name is retained, however, in Hammar's monograph, where it is stated of the type, "corolla dorsum roseum habet"; and two varieties are shown, characterized as follows:—

β speciosa.—"Floribus majoribus, magis purpurascentibus, densius racemosis, petalo inferiore sæpe patulo, sepalis latioribus subintegris."

γ albiflora.—"Floribus minoribus, albidis, apice atropurpureis, sepalis aliquanto longioribus."

These varieties are not recognized by Haussknecht, who admits two forms only of the European plant, viz. *grandiflora*, to which he says *F. speciosa* Jord. belongs, and *parviflora*, which includes *F. pallidiflora* Jord. He adds that the species is easily distinguished by its large sepals, recurved pedicels, and proportionately small, smooth fruits, and attributes the differences between the two forms to environment, *grandiflora* prevailing in spring in dry sunny places, and *parviflora* being the product of shady damper ground in summer.

Nicotra follows the arrangement of Hammar with the varieties *β flavescens* (=*F. pallidiflora* Jord.) and *γ speciosa* (=*F. speciosa* Jord.); and in Rouy and Foucaud's *Flore de France* (i. p. 171) the forms stand thus:—

"*α albiflora* Hamm. Mon." (= *F. pallidiflora* Jord.).
"*β speciosa* Hamm. Mon." (= *F. speciosa* Jord.).

"γ *provincialis* nob." With large flowers and coloured sepals.
"δ *atrosanguinea* Brock. & Neyr." With dark red flowers.

The varietal distinctions being based, as before, mainly on the colour of the corolla and the form of the sepals.

It is noteworthy that none of these Continental authors mention any differences in the fruits of these plants, excepting Jordan, who, in his original diagnosis of *F. speciosa*, states that they are more obtuse than those of *F. capreolata.*

There is fortunately a large series of foreign examples of this species at Kew and the British Museum, which I have recently examined; and I can only conclude that the differences to be seen are almost entirely those of form in the sepals, and size and colour in the corolla. Specimens which appear to be shade-grown generally show smaller and paler flowers, with longer and narrower sepals, than those that are more normal; but I do not think environment to be the sole cause of variation, for such plants as Jordan designated *F. speciosa* appear to produce, under similar conditions, more highly coloured flowers, and perhaps on an average somewhat shorter sepals than are found on the more generally distributed form which Hammar takes as the type. A good sheet of authentic and well-grown *F. speciosa* Jord. at the British Museum (which was not available in 1902) shows the upper petal dorsally suffused with rosy-purple almost from the bud stage, the colour eventually overspreading the whole corolla, when it contrasts strongly with the whitish sepals. I have received similar specimens from Hyères and the Pyrenees. On the other hand, in the pale-flowered form, the reddish suffusion, if present at all before fertilization, is confined to the back of the upper petal and never covers the whole corolla; and I think Jordan was probably correct also in attributing a greater persistency to the corolla of his *F. pallidiflora.*

With regard to the fruit, the small smooth type that Haussknecht thought a feature of the aggregate species is to be found, with no appreciable variation, in all the plants that I have examined, except that in some French specimens a narrower and consequently less obtuse outline obtains, which Jordan probably considered characteristic of his *F. pallidiflora.*

I therefore follow Hammar in his conception of the type of *F. capreolata*, and in regarding *F. speciosa* as hardly differing except in floral characters, and indeed little more than a colour variety.

It will now be seen, on turning to my former paper (Journ. Bot. 1902, p. 131), that the plant of the Channel Islands which I separated from the British form and referred to *F. speciosa* has flowers too pale to be rightly assigned to that variety, and is really identical with the Continental type, as defined by Hammar. Other specimens that I have since seen from Guernsey belong to the same form, but from Mr. Marquand's remark in his *Flora*—"Mr. Andrews has found a pink form at Les Terres, and another with dark red-purple flowers near the Gouffre; these are probably var. *speciosa*"—I expect that true *speciosa* may also be met with.

The distinctions drawn in my paper, however, between the Guernsey and the British forms undoubtedly hold good, so it would appear that this latter plant differs not only from the former but from all other known forms by its much larger and more rectangular fruits. It is curious that while this feature attracted the notice of Babington, on comparing our plant with specimens of *F. speciosa* from Montpellier (Trans. Linn. Soc. 1859), he does not appear to have realized that the small rotund fruits which he noticed in *F. speciosa* are likewise found in all the *capreolata* forms outside of these islands. This is perhaps due to a lack of sufficient adequate specimens.

The discovery of this difference in the fruit of the British *F. capreolata* has naturally led me to look for further peculiarities, and I think a few other but less important distinctions may certainly be drawn. In the first place, the fruit, besides being larger and less rounded, is also, when dry, less smooth and polished, and occasionally even shows a fine rugulosity. The sepals, too, are frequently a little longer than in any Continental forms, and the tip of the upper petal is conspicuously acute owing to a less abrupt termination of the keel and a smaller development of the wings.

So far as my experience goes, specimens from Great Britain and Ireland exhibit these peculiarities with fair uniformity, but sometimes there is, in well-grown plants, a difference in the breadth of the sepals, and in certain seasons, such as the cool and wet summer of 1903, the corolla may become more or less dorsally suffused with red as in the Continental type. In West Cornwall a form occurs in which the pink tinting is more pronounced and the fruiting pedicels are generally divaricate instead of recurved, thus belying the principal specific character. Another form in North Devon has broad and rounded fruits, resembling those of Continental plants but twice as large and finely rugulose.

It follows that our ordinary plant must be distinguished from the Continental *F. capreolata*, and in view of its several divergences, it may be thought specifically distinct. Its most important difference lies of course in the fruit, and I have not noticed a gradation of forms. But in some other Fumarias also, a considerable variation may be observed in this organ; so, although I believe the differences in this case to be permanent and not the result of present environment, yet, considering our plant's general close resemblance to such a well-defined species as *F. capreolata*, it seems hypercritical to accord it separate specific rank and preferable to regard it rather as a well-marked variety. I therefore propose to class it thus and to name it after Babington, who was one of the first among British botanists to interest himself in the genus, and who first noticed the chief peculiarity of this particular form.

The plant from West Cornwall already alluded to is evidently a modification of this same form, showing exactly the same type of fruit, and I therefore rank it as a subvariety only. The Devonshire plant, however, is more distinct, and as its large fruits resemble in outline those of the Continental type rather than the common British form, I think it should be maintained as a separate variety.

The synonymy, description, and distribution of these plants will therefore stand as follows:—

F. CAPREOLATA L. Spec. Plant. ed. i. p. 701 (1753); Parlat. Mon. Fum. p. 76 (1844); Gren. & Godr. Fl. de Fr. i. p. 66 (1850); Hamm. Mon. p. 24 (1857); Haussknecht in Flora, p. 539 (1873); Rouy & Foucaud, Fl. de Fr. i. p. 171 (1893); Nicotra, Le Fumar. Ital. p. 43 (1897).

F. pallidiflora Jordan in Schultz, Archives, p. 305 (1854); Boreau, Fl. du Centre de la Fr. ed. 3, p. 34 (1857).

[*F. speciosa* Jord. in Cat. Grenoble (1849) = a variety perhaps found in Guernsey, but not known in Britain.]

Icones.—Flora Danica, t. 2359; Hamm. Mon. tab. iii. fig. 1; Journ. Bot. xl. tab. 436, fig. 2 (as *F. speciosa* Jord.).

Exsiccata.—Heldreich, Herb. Græc. Norm. no. 1003! Bourgeau, Pyrénées Espagnoles, 1847, no. 391 (also well represented at Kew)! Neugebauer, Fl. Exsicc. Austro-Hungarica, no. 2899!

A plant of generally robust habit, sparingly branched and with long internodes, diffuse or suberect, and *climbing* by its cirrhose petioles sometimes to a height of several feet. Leaves irregularly 2–3 pinnatisect, light green; the leaflets incised with oblong or cuneiform, acute or mucronate lobes. *Racemes rather dense, many* (sub-20) *flowered*, and, at least the lower ones, *shorter than their peduncles*. *Bracts* linear-lanceolate, acuminate, usually *a little shorter than the* stout fruiting *pedicels*, which are normally *rigidly arcuate-recurved in* flower and *fruit* (the curve showing chiefly towards the base), but occasionally in starved or shade-grown plants are straight and divaricate. *Sepals* 4–6 *mm. long and* 2½–3 *mm. broad*, normally *broadly oval* but narrower when shade-grown, peltate, more or less toothed about the base but usually entire towards the *acute* or shortly acuminate *apex*, whitish in colour and often dorsally marked with green, broader than the corolla-tube. *Corolla* 10–14 *mm. long*, but not often exceeding 12 mm., *creamy white in colour*, with the tip of the inner petals and the *wings* of the upper one *blackish red*, and sometimes, indeed, usually after fertilization, a reddish dorsal suffusion. *Upper petal dorsally very narrow, acute, the wings* not reaching the apex, and *not covering the greenish keel: lower petal with erect and very narrow margins*. *Fruit small*, 2 mm. long and a trifle less in breadth, *subrotund*, little compressed laterally and obscurely keeled, *very obtuse* but not truncate, and *smooth* when dry, with small but well-marked apical pits.

β. BABINGTONII, nov. var.

F. pallidiflora Babington in Trans. Linn. Soc. vol. iv. p. 157 (1859), et passim, non Jordan.

F. capreolata L. subsp. *F. pallidiflora* Syme, Eng. Bot. ed. 3, i. p. 105 (1863).

Icon.—Journ. Bot. xl. tab. 436, fig. 1 (as *F. capreolata*).

The figure of this in *English Botany*, ed. 3, drawn from a Somerset specimen, is, like the plates of the other large-flowered Fumitories in this work, altogether inaccurate.

Exiccata.—Rev. Hugh Davies, Bodafon, 1799, Herb. Mus. Brit.! Rev. H. J. Riddelsdell, Llangenydd, 1904, Herb. Mus. Brit.! H. Trimen, Felixstowe, 1869, Herb. Mus. Brit. (as *F. Boræi*)!

Bracteæ sæpissime pedicellos fructiferos æquantes; sepala interdum ut in typo interdum angustiora, oblonga, corollæ dimidium æquantia; corolla persistens, *petalo superiore* propter carinam productam et alas parvas *acutissimo; fructus* quam in typo *major*, 2½ mm. longus plus 2 mm. latus, *truncatus*, siccitate aliquanto *rectangularis* et sæpe paululum rugulosus.

Bracts generally equalling in length the fruiting pedicels. Sepals sometimes as in the type, but frequently narrower, oval in outline, and fully half as long as the corolla. Corolla very persistent; the *upper petal more acute* than in the type, owing to a less abrupt termination of the keel, and with a smaller development of the lateral wings. *Fruit* distinctly *larger than in the type*, more compressed laterally, *longer than broad*, fully 2½ mm. in length and over 2 mm. in breadth, *truncate*, and, when dry, somewhat *rectangular in profile*, and very often faintly rugulose.

Sub-var. *divaricata*.

Sepalis longissimis sæpe 6 mm. superantibus, corollâ profundius coloratâ, pedicellis fructiferis sæpe rectis divaricatis nec recurvatis a varietate *Babingtonii* differt.

Sepals very long, frequently exceeding 6 mm., corolla more tinted with pink. Fruiting pedicels in normal plants not regularly arcuate-recurved, but variable in direction, and often straight and divaricate.

γ. DEVONIENSIS, nov. var.

Pedicelli bracteis longioribus minus quam in typo recurvati. *Flores ut in var. Babingtonii* sed profundius rosei. *Fructus mediocris*, 2½ mm. longus latusque, obtusissimus sed vix truncatus, infrà angustatus nec rectangularis, *typi fructui lato similis sed subduplo major*, et paulo rugulosus.

Pedicels less strongly recurved than in the type, and with longer bracts. *Flowers as in var. β*, but more tinted with pink. *Fruit of moderate size*, little compressed laterally, 2½ mm. long and fully as broad, very rounded-obtuse but scarcely truncate, narrowed below and *not at all rectangular* in profile, rather *resembling the broad fruit of the type but twice as large* and finely rugulose.

Distribution (of the species).—*F. capreolata* is a widely distributed species, ranging from Western Europe and North Africa to Asia Minor; while the variety *speciosa* has been extensively introduced on the American Continent.

The countries in which it is known to occur are as follows:—

South Sweden! Denmark. Germany! Tyrol (*Haussk.*).

Switzerland! Holland (*Haussk.*). Belgium! France! Spain! Portugal! Corsica! Sardinia (*Hb. Kew*)! Italy! Sicily! Istria! Croatia (*Haussk.*). Dalmatia! Turkey (*Haussk.*). Greece! Crete!

Caria (*Haussk.*). Lycia (*Haussk.*). Cilicia! Syria (*Haussk.*).

Egypt (*Haussk.*). Algeria! Morocco (*Haussk.*). Canaries (*Haussk.*). St. Helena (*Haussk.*).

Peru (*Haussk.*). Paraguay (var. *speciosa*)! Argentina (*Hb. Kew*, var. *speciosa*)! Florida (var. *speciosa*)!

In Britain this species is not only a weed of cultivated fields, but may often be found in hedge-banks, sometimes growing to a large size, and on old walls. I have also collected it from shady rocks, but only in the neighbourhood of cultivation, from which it has probably spread.

The prevailing form with us is the variety *Babingtonii*, but I have seen specimens from Swanpool, near Falmouth, that perhaps should be referred to the type, to which also it may be found that other plants of the south coast belong. As may be expected, the type alone, or possibly with the variety *speciosa*, is to be found in the Channel Islands, while all the specimens I have seen from Ireland are referable to the variety *Babingtonii*, which occurs throughout Great Britain, though never, in my experience, in such abundance as *F. Borœi*. In *Topographical Botany* and its Supplement records are shown under *F. capreolata* for forty-three vice-counties. Of these, I believe three to be erroneous, *viz.* Surrey and Middlesex, which produce only forms of *F. Borœi*, and Selkirk, Mr. Brotherston's specimen being *F. purpurea*. To the number remaining (forty), however, one may be added, *viz.* Moray, making a total of forty-one, of which Cheshire, South Lancs, and Roxburgh, quoted in *Topographical Botany* without personal authority, and North Wilts, East Kent, and Derby, in the Supplement, must be considered doubtful.

The vice-counties for which I have records (all for var. *Babingtonii*) are as follows:—

1. *W. Cornwall:* Penzance (with sub-var. *divaricata*)!! Falmouth!! Padstow, *F. H. Davey*, 1904! 3. *S. Devon:* Paignton!! 4. *N. Devon:* Lynmouth!! Ilfracombe!! Morthoe!! 5. *S. Somerset:* Minehead, *A. Ley*, 1906! Dunster!! 6. *N. Somerset:* Near Cheddar (*Hb. Mus. Brit.*)! 10. *Wight:* Bonchurch, *Borrer*, 1848 (*Hb. Mus. Brit.*)! 14. *E. Sussex:* Pett (*Hb. C. E. Salmon*)! Guestling, *Rev. Bloomfield*! 19. *N. Essex:* Harwich (*Hb. Mus. Brit.*)! Wivenhoe (*Hb. Kew*)! 23. *Oxford:* Iffley Road (*Hb. Druce*)! 25. *E. Suffolk:* Felixstowe (*Hb. Hind*)! 41. *Glamorgan:* Oxwich (*Hb. Riddelsdell*)! 49. *Carnarvon:* Llandudno, *H. Fisher*, 1884! Bodafon and Llangefar, 1799 (*Hb. Mus. Brit.*)! Llanfairfechan!! 50. *Denbigh:* Mochdre, *C. Waterfall*, 1900! 60. *W. Lancs:* Aldcliffe (*Hb. Druce*)! 66. *Durham:* Hartlepool (*Hb. Druce*)! 95. *Moray:* Alves (*Hb. Brit. Linn. Soc.*)! 108. *W. Sutherland:* Loch Eriboll (*Hb. Watson*)! 111. *Orkney:* Mainland, *E. S. Marshall*, no. 2412 (ex parte)!

The variety *devoniensis* was collected at Woolacombe, North Devon, in 1898 and 1903.

2. Fumaria purpurea Pugsley.

In the case of this species considerable fresh information has been gained since 1902, but none such as to materially affect my original account of the plant. No foreign specimens, but examples from many British and Irish counties, have come under my notice, and it may now be reasonably assumed that the species, which is widely spread throughout these islands, is endemic.

Except in two points, the plants examined show a general uniformity which renders their determination easy. But some specimens bear flowers so much larger than those originally examined that I was at first disposed to think them a distinct variety. After further experience, however, I am satisfied that they are nothing more than an early large-flowered state, such as may be observed with many other species of the genus.

The second exceptional form, which occurs both in Great Britain and Ireland, is characterized by relatively short sepals and bracts, and seems in these respects to be permanently distinct and a good variety, apparently somewhat analogous with Haussknecht's var. *intermedia* of *F. capreolata*.

The plate of *F. capreolata* in Curtis's *Flora Londinensis* ii. 145 (fasc. vi. 47), which Babington thought to represent the plant now called *F. purpurea*, is pretty certainly drawn from the true *F. Boræi* Jord. The short peduncles and bracts and few-flowered racemes are good evidence of this, although the conspicuous neck of the fruit recalls *F. purpurea*. The localities cited by Curtis further point to *F. Boræi* being the plant intended.

The synonymy, description, and distribution of *F. purpurea*, which has not hitherto been fully diagnosed except as *F. Boræi*, are as follows:—

F. purpurea Pugsley in Journ. Bot. vol. 40, p. 135 (1902).

F. Boræi Bab. in Trans. Linn. Soc. vol. iv. p. 157 (1859), et passim, non Jordan.

F. capreolata L. sub-sp. *F. Boræi* Syme, Eng. Bot. ed. 3, i. p. 106 (1863).

Icon.—Journ. Bot. xl. tab. 436, fig. 3.

Exsiccata.—J. B. Syme, Dunearn Hill, Fife, 1871, Hb. Mus. Brit. (as *F. Boræi*)! F. Townsend, Great Malvern, 1881, Hb. Mus. Brit. (as *F. Boræi*)! G. Brotherston, Galashiels, 1874, Hb. Mus. Brit. (as *F. pallidiflora*)!

Fumaria annua, habitu robusto, diffuso vel petiolis cirrhosis scandente. Caulis ramosior humiliorque quam in *F. capreolatâ*. Folia ut in *F. capreolatâ*, sed foliolis in lobos paulo angustiores fissis. *Racemi multiflori* (inferiores vulgo 20–24-flori), *laxiusculi*, tandem elongati, *pedunculis* fere *æquilongi*. *Bracteæ* lineari-lanceolatæ, acuminatæ *pedicellos fructiferos apice incrassatos patenti-recurvos vel divaricatos æquantes* aut inferiores interdum multo longiores et foliatæ. *Sepala* 5–6½ *mm. longa et* 2–3 *mm.*

lata, *oblonga*, peltata, inferne subdentata et sæpissime ad *apicem nunc subacutum nunc rotundatum* integriuscula, præter nervum dorsalem latum viridiusculum albida aut dilute purpurea, corollæ tubo latiora. *Corolla* 10–13 *mm. longa*, pallide vel profunde *roseo-purpurea ; petalo superiore latiusculo*, *acuto*, *alis atropurpureis* reflexis *carinam excedentibus* sed apicem vix attingentibus prædito : *petalo inferiore marginibus erectis angustisque* ; petalis interioribus sursum curvatis, apice atropurpureis. *Fructus mediocres*, prope 2½ mm. longi et sæpissime paulisper latiores, *subrotundo-quadrati*, *truncati* vel etiam subemarginati, stipite distincto quam pedicelli apex incrassatus angustiore in vivo præditi, siccitate leviter *rugulosi* et obscurius quam in *F. capreolatâ* apice bifoveolati.

Habitat in insulis Britannicis.

A robust plant, diffuse, ascending or climbing by its cirrhose petioles, usually more branched and less rampant than *F. capreolata*. Leaves as in *F. capreolata*, but the leaflets (on an average) with somewhat narrower lobes. *Racemes many-flowered* (the lower generally 20–24-flowered), *lax*, about *as long as the peduncles*. *Bracts* linear-lanceolate, acuminate, *as long as the fruiting pedicels, the lowest sometimes foliaceous and much longer. Pedicels* stout, *rigidly patent-recurved in fruit* (the curve less marked than in *F. capreolata*), or sometimes divaricate. *Sepals* 5–6½ *mm. long and* 2–3 *mm. broad*, *oblong*, peltate, a little toothed in the lower half, usually entire towards the *rounded or shortly acute apex*; whitish or purple-tinted in colour, with a broad median band of green, broader than the corolla-tube. *Corolla* 10–13 *mm. long*, pale or deep *purple in colour* (less rosy pink than in *F. Boræi*), with the tip of the inner petals and the *wings* of the upper one *dark purple. Upper petal dorsally rather broad*, *acute*, *the wings* scarcely reaching the apex, but *exceeding the keel*; *lower petal with erect and narrow margins. Fruits of moderate size*, about 2½ mm. long and as broad or a little broader, *squarish in profile*, laterally compressed but obscurely keeled, *truncate* or even subemarginate, and *faintly rugulose* when dry, with broader and shallower apical pits than in *F. capreolata.*

β. BREVISEPALA, nov. var.

Exsiccata.—W. Beckwith, Wroxeter, 1882, Hb. Mus. Brit. (as *F. Boræi*) !

Bracteæ lineari-oblongæ, quam in typo latiores, subacutæ vel mucronatæ, *pedicellos fructiferos non superantes. Sepala* 4½–5 mm. longa, 2½–3 mm. lata, *late ovalia*, subacuta, plus minusve irregulariter dentata, quam corollæ dimidium manifeste breviora.

Bracts broader than in the type, linear-oblong, subacute or mucronate, *not exceeding the fruiting pedicels. Sepals* 4½–5 mm. long and 2½–3 mm. broad, *broadly oval*, subacute, more or less toothed, distinctly less than half as long as the corolla. Otherwise as the type.

F. purpurea may be distinguished from all forms of *F. capreo-*

lata by its laxer racemes, blunter sepals, broader and more broadly winged corollas, and squarish, truncate fruits.

From *F. macrosepala* Boiss. it is separated by its many-flowered racemes, patent-recurved pedicels, narrower or smaller sepals, and truncate instead of pointed fruits.

F. flabellata Gasp. differs by its very long peduncles, smaller sepals, white, broadly winged and obtuse corollas, and rugose fruits.

F. montana Schmidt would seem to differ widely by its few-flowered racemes, smaller calyx and corolla, and pointed fruits.

Few-flowered racemes, with smaller and paler flowers, also serve to distinguish *F. malacitana* Haussk. and *F. gaditana* Haussk., accompanied, in the case of the former, by broadly ovate sepals, and with the latter, relatively smaller sepals and smooth, rounded fruits.

In form of corolla, *F. purpurea* shows a resemblance to *F. Borœi* Jord., in the subsection *Mediœ*, but it may be distinguished by its longer and more richly flowered racemes borne on longer peduncles, its thickened pedicels with longer bracts, its larger, blunter, and less toothed sepals, and its truncate fruits, which distinctly show, when fresh, the "neck" characteristic of the *capreolatœ*.

Distribution.—*F. purpurea*, which grows in situations similar to those affected by *F. capreolata*, is endemic to the British Isles, and unknown on the Continent.

It is widely distributed in Ireland, as shown by Mr. Praeger; I have an Irish specimen of the variety *brevisepala* labelled "Killiney, Co. Dublin. N. Colgan, 1902."

As might be expected, the species has not been recorded for the Channel Islands.

In Great Britain it is known to occur in the following vice-counties, *viz.*:—

1. *W. Cornwall:* Penzance!! Near Newquay, *C. C. Vigurs*, 1905 (var. *brevisepala*)! 3. *S. Devon:* Torquay (*Hb. A. Bennett*)! 4. *N. Devon:* Ashford (*Hb. Painter*)! Ilfracombe!! Lee!! Woolacombe!! 6. *N. Somerset:* Christon (*Hb. Mrs. Gregory*)! 9. *Dorset:* Manston (*Hb. Riddelsdell*)! 19. *N. Essex:* Walton-on-Naze (*Hb. Groves*)! 21. *Middlesex:* Uxbridge Common, 1892, abnormal (*Hb. Benbow*)! 23. *Oxford:* Cowley Place, Oxford, 1860 (*Hb. Druce*)! 34. *W. Gloucester:* Beachley and Lancant (*Hb. St. Brody*)! 35. *Monmouth:* Chepstow (*Hb. Mus. Brit.*)! 36. *Hereford:* Ross (*Hb. Mus. Dublin*)! 37. *Worcester:* Malvern (*Hb. Mus. Brit.*)! 40. *Salop:* Shrewsbury (*Hb. Dillenius*)! Wroxeter (*Hb. Mus. Brit.*, var. *brevisepala*)! Stokesay (*Hb. Druce*)! Acton Scott (*Hb. Kew*)! Welsh Hampton (*Hb. Painter*)! 41. *Glamorgan:* Aberavon (*Motley* in *Hb. Riddelsdell*)! Port Talbot (*Hb. Riddelsdell*)! 45. *Pembroke:* Tenby, *H. Trimen* (*Hb. Mus. Brit.*)! 49. *Carnarvon:* Near Llandudno (*Hb. Hume*, var. *brevisepala*)! 59. *S. Lancs:* Liverpool, 1803 (*Hb. Sir J. Smith*)! Ford, 1911 (*Hb. Travis*)! 60. *W. Lancs:* Preesall (*Hb. A. B. Jackson*)! Halton and near Warton (*Hb. Wheldon*)! Near

Lancaster, 1907, *A. Wilson*! 61. *S. E. Yorks:* Skipwith (*Hb. Mus. Brit.*)! 62. *N. E. Yorks:* Clifton, near York, 1842 (*Hb. Mus. Brit.*)! Northallerton (*Hb. Mus. Brit.*)! 66. *Durham:* Embleton (*Hb. A. G. More*)! 68. *Cheviotland:* Bamborough (*Hb. Somerville*)! 69. *Westmoreland and Lake Lancs:* Bardsea (*Hb. Mus. Brit.*)! Grasmere (*Hb. E. F. Linton*)! Howtown (*Hb. Miss Palmer*)! 70. *Cumberland:* (*Hb. Groves*)! 71. *Isle of Man:* Port Erin (*Hb. Hiern*)! 79. *Selkirk:* Near Galashiels (*Hb. Mus. Brit.*)! 80. *Roxburgh:* Kelso (*Hb. Mus. Brit.*)! 82. *Haddington:* (*Hb. Boswell*)! 83. *Edinburgh:* (*Hb. Mus. Brit.*)! Dalhousie (*Hb. Mus. Dublin*)! 85. *Fife:* Dunearn Hill (*Hb. Mus. Brit.*)! Kirkaldy (*Hb. Druce*)! 90. *Forfar:* (*Hb. Mus. Brit.*)! 111. *Orkney:* (*Hb. Boswell*)! Mainland, *E. S. Marshall*, no. 2412 (ex parte)!

Subsection 2. Mediæ or *Murales* of Haussknecht.

Peduncles usually shorter than in subsection 1. Pedicels less thickened towards the tip, generally erect-spreading in fruit. Flowers of the later racemes sometimes notably fewer and less developed than those preceding them. Bracts generally shorter than the fruiting pedicels. Sepals usually more or less toothed, rarely much broader than the corolla, or exceeding one-third of its whole length. Fruit obtuse or subacute, obscurely keeled, and, when fresh, with an indistinct fleshy neck, which is narrower or broader than the tip of the pedicel.

This group is the most difficult of the whole genus, and one on which authors have shown the widest divergences of opinion.

So far as British plants are concerned, an elucidation of these difficulties was formerly not essential, but with the recent discovery of several new forms, it becomes necessary to consider the general subsection more closely.

The *Murales* are divided by Haussknecht into two classes, according to the rugosity or smoothness of the dried fruit; the first, with rugose fruit, consisting of one species only, *F. Gussonei* Boiss., and the second, with fruit smooth or nearly so, comprising *F. Reuteri* Boiss., *F. sepium* Boiss., *F. muralis* Sond., *F. Boræi* Jord., and *F. Munbyi* Boiss. This means of segregation is perhaps as serviceable in the herbarium as any that could be devised, but it is not entirely satisfactory, for the rugosity is often obscure in the forms of *F. Gussonei* before the fruits are ripe, and gradations of this character certainly occur in some of the other species, with the occasional result that individual fruits which should be rugose will appear smoother than others which show in a marked degree the finer wrinkling that is described as rugulose. Under *F. Gussonei* a number of forms are grouped that had previously been described as species, and among them are *F. Bastardi* Boreau, *F. confusa* Jord., *F. vagans* Jord., and *F. affinis* Hamm. Haussknecht appears to have united these plants as one species after an extensive examination of dried material but with little knowledge of the living plants, and his views differ in a marked degree from those of Hammar, whose descriptions are largely taken from fresh specimens cultivated in the Botanical Garden at Lund. Hammar places *F. Gussonei* as a species among his *Capreolatæ*, where *F. confusa* also stands, associated with *F. Borœi* and *F. muralis* as varieties of *F. media* Lois. On the other hand, *F. affinis* and *F. vagans* are made distinct species in the section *Agrariæ*. With Haussknecht, I quite fail to understand why Hammar should join the rugose-fruited *F. confusa* with *F. Borœi* and *F. muralis*, but the other discrepancies between the two monographers seem less inexplicable. Hammar placed his *F. affinis* and *F. vagans* among the *Agrariæ* owing to the form of the lower petal, which may easily be mistaken in dried specimens, and becomes essentially obscure in ill-grown plants. There can be little doubt, judging from his measurements, but that most of the specimens in this group examined by Haussknecht showed poor flowers, and with these in the dry state he probably did not suspect that any of them could produce a lower petal of the *Agrariæ* type, although such may be found, under favourable conditions, not only in *F. affinis* and *F. vagans*, where it was observed by Hammar, but also in the British *F. confusa*, and even in typical *F. Gussonei*.

In this respect then, as well as in the rugosity of the fruit, these forms united by Haussknecht under *F. Gussonei* tend to approach the subsection *Agrariæ*, to which a further resemblance is seen in some cases in the absence of the dark-coloured tip of the upper petal.

Of the smooth-fruited species, *F. Reuteri* shows an unmistakable likeness to *F. Thureti* Boiss. and *F. anatolica* Boiss. of the subsection *Latisepalæ* of the *Parvifloræ*, and to this *F. Munbyi* also is probably less closely allied, although it is regarded by Hammar as synonymous with *F. Borœi*. The remaining species show more affinity with the *Capreolatæ*. The relations of *F. muralis* and *F. Borœi*, reduced to varieties of *F. media* Lois. by Hammar, were dealt with at some length in my paper in Journ. Bot. 1902, and now require a further elaboration owing to the great diversity of forms occurring in these islands. *F. sepium*, which is kept up as a species by both monographers but in Rouy & Foucaud's *Flore de France* is made a synonym of *F. muralis* var. *platycarpa*, is a rare Spanish plant, chiefly remarkable for its lanceolate sepals, of which I have seen no authentic specimen.

* Fruit, when dry, smooth or nearly so, rarely distinctly rugulose at maturity.

3. Fumaria muralis Sonder.

The determination of the plant found by Sonder near Hamburg and described under this name was dealt with at length in Journ. Bot. vol. xl. pp. 175 *sqq.*, where it was shown to differ from similar slender forms growing in Britain that had formerly been referred to the same species. These slender forms were placed as varieties under *F. Borœi* Jord., which, owing to the large series of intermediates, was itself made a subspecies of *F. muralis*, the clavis on p. 180, *l. c.*, accounting for all the forms of which adequate material had then come under my notice.

Since 1902 I have been able to examine additional foreign material at the British Museum and at Kew, which shows that abroad also this species is unstable, and besides many varying British forms, a more distinct plant has come to light in West Cornwall, which can only be classed as a fresh subspecies.

The original plant of Sonder, of which I have seen numerous dried specimens, either cultivated or gathered at different dates at Hamburg, seems perfectly uniform in its slender habit, small, apiculate flowers, and very small, smooth fruits, subrotund-ovate and subacute in outline and less than 2 mm. in length. Exactly similar plants occur in the Atlantic Islands and elsewhere, but at Madeira, where *F. muralis* is very abundant, a somewhat different form is prevalent which seems to deserve varietal distinction. In this the fruit is completely rounded-obtuse — indeed, almost globular—though no larger than in Sonder's type; and it appears to be the *F. muralis* a. *vulgaris* of Lowe's Fl. Mader. i. p. 13, of which the author remarks: "Achenes . . . . . perfectly globose or equally orbicular all round . . . . not apiculate." Some of Lowe's specimens at South Kensington show fruit of this form, while others entirely resemble the Hamburg plant, from which it may be concluded that Lowe attached little importance to the pointed fruit. His specimens, however, in conjunction with others more recently collected and kindly lent me by Mr. Druce, show that this rounded type of fruit is usually associated with a slight difference in the corolla, the upper petal in such cases being quite blunt (instead of apiculate) owing to its wings extending to the extreme apex. At times, this form also shows much longer racemes, bearing as many as sixteen flowers, and in view of these differences, it may, I think, be conveniently distinguished as var. *Lowei*. Forms intermediate in character also occur in this and other habitats. It is noteworthy that, especially at Madeira, the fruit of *F. muralis* is subject to a disease, which I have observed with no other species, that causes it to swell to a monstrous size.

Of the British plants referable to *F. muralis*, as restricted in my former paper, I have seen none agreeing with var. *Lowei*. Mr. Reader's Staffordshire examples are identical with the type, except perhaps that the apex of the fruit is apiculate rather than subacute. Specimens from Hants, Kent, and other localities, seem to differ only in the size of the fruit, which, though larger, is still of true *muralis* form. Such plants provide a connecting link with the slender varieties of *F. Boræi*, but as in habit and flower they are essentially *F. muralis*, I consider them to be a large-fruited variety of that segregate, and am distinguishing them as var. *decipiens*.

The chief difficulty with these plants, however, lies in the arrangement of the slender forms whose fruits are obtuse, more or less obovate and larger than those of the true plant of Sonder.

Some of these fumitories are highly critical, and differences of opinion may arise as to their exact affinities. In the British Islands they have reached a very varied development, which perhaps obtains in no other country and was never suspected by Haussknecht when, without any hesitation, he ranked *F. muralis* and *F. Borœi* as distinct species in his monograph. Some of the variations are well marked, and readily admit of precise definition, but gradations in habit, flower and fruit are so numerous and irregular that a clear line of demarcation between *F. muralis* and *F. Borœi*, even as subspecies, is by no means easily drawn. The difficulty is increased by the recognition of the globose-fruited plant of Madeira as a variety of *F. muralis*, as this destroys the value of the pointed fruit as a clear subspecific character. But the only view that can reasonably be held, when it is remembered that the Atlantic Islands, and not North Germany, are the headquarters of the species, is that the Hamburg type is a local form of a plant subject to considerable variation. On the other hand, as *F. Borœi* (of which nearly all the foreign material both at the British Museum and at Kew is French) is a plant of Western Europe, and is perhaps nowhere so abundant as in Britain, the variants that occur here, though often more or less tending towards the type of *F. muralis*, must generally be regarded as local modifications of *F. Borœi*, and I therefore adhere to the retention of these forms under this latter subspecies, as shown in my paper of 1902, albeit some of them superficially bear the facies of *F. muralis* Sonder.

So far as I am aware, the only named varieties of *F. Borœi* published prior to 1902 are those in Clavaud's *Flore de la Gironde* (p. 47), which I adopted in my earlier paper. These varieties are described in some detail, although little is stated respecting *F. Borœi* itself, and their alleged deviations from Jordan's type correspond closely with variations to be seen in Britain. As Clavaud's figure of his variety *muraliformis*, however, recalls the globose-fruited plant of Madeira, and as *F. muralis* is recorded for the Gironde district by Haussknecht, as well as in Rouy and Foucaud's *Flore de France*, I have obtained for inspection, through the kindness of M. Beille, Clavaud's actual specimens from the Jardin des Plantes at Bordeaux. These specimens represent the varieties *muraliformis* and *verna* only, var. *serotina* being absent from Clavaud's herbarium. Of the variety *muraliformis* there are two small plants, one fairly normal and showing both flowers and fruit. This resembles the British plant to which I have applied Clavaud's name, except that its flowers are smaller and the fruits, though somewhat obovate, no larger than in typical *F. muralis*. The other variety, *verna*, is represented by two small and young plants obtained early in the year from fallows. Only one of them shows any fruits, and these, which are possibly not quite mature, are of *muralis* size, globular and apiculate. The flowers, which appear normal, are in one example 11 mm. long, and in the other 2 mm. less—in both smaller than an average good flower of typical *F. Borœi*. As Clavaud states that the flowers of var. *verna* are larger than those of the type, it is evident that this type is not the plant of Jordan, and I suspect that the varieties *muraliformis* and *verna* are really both forms of one plant, which is probably prevalent in the Bordeaux district and was correctly placed by Haussknecht under *F. muralis.* It is not possible from Clavaud's specimens to fix its exact position with certainty, but I think it is not very different from the Madeira variety *Lowei.*

In these circumstances it is obvious that Clavaud's name *verna* cannot stand for the large and dark-flowered form of *F. Boræi* found in Guernsey, and as *muraliformis*, too, is at least doubtful, it seems advisable to abandon both names, and also *serotina*, about which nothing can apparently be proved. This necessitates a revision of the naming of the British varieties of *F. Boræi.*

Of these, the Guernsey plant formerly referred to var. *verna* is one whose constancy from seed may, I think, be doubted ; and so I rank it as a form of the type, rather than a real variety, and propose to distinguish it as f. *rubens.*

The plant that I have referred to Clavaud's *muraliformis* appears, on the contrary, to be more permanently distinct. Since 1902 I have seen it from localities where it assumes a more robust habit than I had previously observed, but its foliage, as much as its irregular pedicels, seems to be constantly characteristic, and I now label it var. *gracilis.*

But the most widely distributed of these varieties is that which I have been naming var. *serotina.* This occurs in many localities as a well-marked and uniform plant almost equidistant in characters between the types of *F. Boræi* and *F. muralis* ; and were it not that it is often associated with more or less typical *F. Boræi*, and connected by intermediates, one might well hesitate where to place it. I propose to adopt for this variety the name *britannica.*

The remaining variety, *ambigua*, of my former paper, of which I have seen but few specimens from fresh habitats, I think may stand unaltered.

In addition to these variations, a few other interesting forms of *F. Boræi* have been noticed, which perhaps should be distinguished. Among them is a robust but very lax form of the type, with glaucous foliage and few-flowered racemes, which I have collected in West Somerset. It also occurs in Ireland, and probably in other districts, and I am labelling it f. *elongata.*

Near the variety *britannica*, but differing in its longer sepals and bracts and its shorter and thicker pedicels, is a further form very general in North Wales. This may be regarded as a subvariety *longibracteata.*

Another plant, which I first received through Mr. C. R. P. Andrews in 1900, from fields at Graie, in Guernsey, and have since seen from Vazon, in the same island, resembles the variety *britannica*, but has almost globose fruits and seems to habitually assume a suberect, much-branched habit, very different from what usually obtains with other forms of the species. This I have distinguished as a second subvariety *sarniensis*. It is, I believe, the *F. muralis* of Mr. Marquand's *Flora of Guernsey*.

This subvariety resembles in some features another peculiar form occurring at Malvern Link, Worcestershire, whose relationship is at present uncertain. Specimens were sent me by the late Mr. Townsend as long ago as the autumn of 1904, and I have subsequently seen others, collected at different dates by Mr. Bickham, but, unfortunately, all of these have been gathered too late to show characteristic flowers. The plant is slender, and, like the Guernsey form, much branched; but it is less erect, and its racemes of subglobose fruits are denser, while the corollas are small and appear quite blunt, like those of *F. muralis* var. *Lowei*. The sepals of the later flowers are large and nearly orbicular, and in this, as in the dense racemes, the plant approximates to the description of *F. muralis* var. *Lebelii*, of Rouy & Foucaud's *Flore de France*. I have, however, seen no authentic examples of var. *Lebelii*, and in view of the poor flowers of the Malvern specimens that I have examined it seems undesirable at present to definitely fix the position of this form, either under *F. Borœi* or *F. muralis*.

It may be well to point out that these essentially slender forms of *F. Borœi* should not be confounded with starved or shade-grown plants of the type, which at times may exhibit a more or less similar aspect.

The new suspecies that has been mentioned was discovered in a cultivated field at Gilly Tresamble, to the north of Penryn, in West Cornwall, in September, 1907, when I was visiting the district for the purpose of seeing *in situ* the handsome new species that Mr. F. H. Davey had met with three years previously. On reaching the locality for Mr. Davey's plant I found that it was associated, not only with *F. Borœi* and *F. Bastardi*, but with another less conspicuous fumitory that had previously been overlooked though obviously distinct from either of them. The salient features of this plant were its short, robust habit, its long racemes of small, blunt flowers, and its very obtuse, almost truncate fruits; and at first sight I suspected it might be a form of *F. Gussonei* Boiss. A little examination, however, served to show that, while the racemes and pedicels recalled *F. Bastardi*, the foliage and the flowers rather resembled those of *F. muralis*, and the fruits, when dried, exhibited no signs of rugosity or broad apical pits.

As the plant is evidently a member of the subsection *Mediæ*, it must thus be located among the smooth-fruited species, and as it differs widely from *F. Reuteri* and *F. Munbyi* in its subtruncate and larger fruits, and from *F. sepium* in its robust habit, many-flowered racemes, and broader sepals, the only described species with which it remains to compare it are *F. Borœi* and *F. muralis*. Its resemblance to the former of these is but slight, owing to its longer racemes and very much smaller and blunter flowers, with shorter bracts and smaller sepals; and to typical *F. muralis* it presents an equally great contrast in its robust habit, long racemes, and very obtuse fruits. But the forms connected with these two types are legion, and some of the Madeira plants that I have named *F. muralis* var. *Lowei* seem to supply a link with this Cornish plant, especially in respect of the long racemes and the form of the corolla. I therefore think that this new plant is best placed as a new subspecies *neglecta* of the aggregate *F. muralis*.

It is no doubt extraordinary that another new fumitory should thus be found in Cornwall, on this occasion, in an isolated field. I think, though, that it was almost certainly introduced at some perhaps remote date from the Continent, and possibly from Spain with the new species next to be described, although I have seen no similar Spanish example. Much more work, I quite believe, has yet to be done in the South of Europe with the Fumarias of this polymorphic subsection, and probably at some future date the headquarters of this particular form will be discovered. The only specimen at the British Museum or at Kew at all resembling *F. neglecta* is one at the latter place, very questionably labelled "Fl. Ital. Exsicc., A. Fiori, A. Béguinot, R. Pampanini, *Fumaria serotina*, Guss, var. *confusa*, Jord. Bordighera, C. Bicknell, Mar. 1904," which I believe to be a shade-form of *F. Gussonei*.

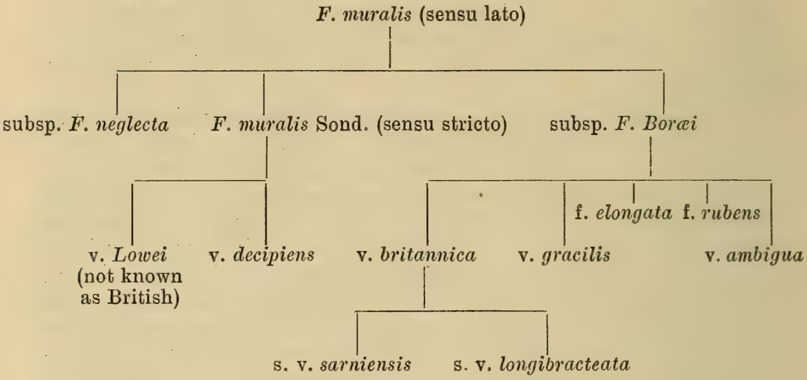
Specimens of this new plant were sent unnamed to the Watson Exchange Club by Mr. F. H. Davey in the winter of 1907–8.

The characters of the plants referable to *F. muralis*, *F. Boræi*, and *F. neglecta* are so divergent that it may be held inconsistent to unite them under one species while other fumitories, apparently differing no more widely, are considered specifically distinct. But it can hardly be questioned that, either in Britain or abroad, nearly all of these *muralis* forms pass into one another, which is not known to happen in the case of our other species. It may be recalled, too, that the comparatively large fruits so prevalent in the British forms are also characteristic of the common British variety of *F. capreolata* and may, with all of these plants, be a result of the moist climatic conditions of our islands.

The features common to all the *muralis* forms, besides the nearly or quite smooth fruits, are a foliage approximating to that of *F. capreolata*: ovate, peltate sepals, toothed chiefly towards the base; a pink corolla; and a dorsally compressed tube of the upper petal, with a distinctly spathulate dilation of the invariably dark purple wings.

From this aggregate species *F. Reuteri* Boiss. and *F. Munbyi* Boiss. are clearly separable by their narrower leaf-segments and smaller, compressed fruits, while the little-known plant, *F. sepium* Boiss., is apparently quite distinct, owing to its narrow lanceolate sepals. *F. gaditana* Haussk., of the subsection *Capreolatæ*, may be distinguished by its much longer peduncles, more entire sepals, and paler flowers.

The relationship of the forms of *F. muralis* may be conveniently shown thus :—


F. muralis (sensu lato)
subsp. *F. neglecta*
F. muralis Sond. (sensu stricto)
subsp. *F. Boræi*
f. *elongata*
f. *rubens*
v. *Lowei* (not known as British)
v. *decipiens*
v. *britannica*
v. *gracilis*
v. *ambigua*
s. v. *sarniensis*
s. v. *longibracteata*

The synonymy, description, and distribution of these plants are as follows :—

3*a*. F. MURALIS (sensu stricto).
Sonder in litt. ap. Koch Synopsis, ed. 2, p. 1017 (1845); Lowe, Fl. Mader. i. p. 13 (1868); Haussknecht in Flora, p. 523 (1873); Rouy & Foucaud, Fl. de Fr. i. p. 172 (1893).
F. media Lois. var. *muralis* in Hamm. Mon. p. 29 (1857) pro parte.
F. apiculata Lange in litt. ap. Hamm. Mon. p. 31, pro parte.
F. officinalis var. *capensis* Harvey in Fl. Capensis, i. p. 18.

Icones.—Flora Danica, t. 2473; Journ. Bot. tab. 436, fig. 4.

Exsiccata.—Billot, Fl. G. et G. no. 2807! A. Jordan, d'Hambourg, cult. 1860, Herb. Mus. Brit.! Mandon, Pl. Mader. no. 5! Bourgeau, Pl. Canar. no. 1173! Lowe, above La Dehesa, P. Orotava, Dec. 4, 1857, Herb. Mus. Brit.!

An essentially *slender* and usually small *plant*, sometimes suberect, compact and much branched in open fields, more often diffuse or climbing by its cirrhose petioles. Leaves irregularly 2–3 pinnatisect, sometimes more or less glaucous, with leaflets (which are frequently very small) cut into oblong or lanceolate, mucronate or acute lobes. *Racemes rather lax and few* (usually sub-12) *flowered*, about *equalling* the straight or incurved *peduncles*. *Bracts* linear-lanceolate, acuminate, usually *two-thirds as long as the slender fruiting pedicels*, which are normally *straight and erect-spreading* or sub-patent but occasionally flexuous and somewhat recurved. *Sepals* 3–4 *mm. long and* 1½–2 *mm. broad*, *ovate*, peltate, often much *toothed*, especially towards the base and along the lower margin, and generally acuminate; whitish in colour or suffused with pink, with a greenish median line; as broad as the corolla tube. *Corolla* 9–11 *mm. long*, but rarely exceeding 10 mm., *pink in colour*, with the tip of the inner petals and the *wings* of the upper one *blackish red*. *Upper petal* somewhat *dorsally compressed but not broad, apiculate*, with a spathulate dilation of the wings (exceeding the keel and nearly reaching the apex), which is apparent in the bud stage, but is obscured when the wings reflex upwards in flower and cover the keel; spur about as long as the sepals. *Lower petal with erect* and narrow *margins*. *Fruits very small*, not exceeding 2 mm. long (including the apiculus), and somewhat less in breadth, *subrotund-ovate* in profile, and *subacute* or apiculate, even when mature and when dried; little compressed laterally, and obscurely keeled, with the fleshy neck almost obsolete; *smooth* when dry, with small and faint apical pits.

β. LOWEI, nov. var. (not known as British).

Exsiccata.—Lowe, Port Orotava, Nov. 16, 1857, Hb. Mus. Brit.!

Differt a typo racemis sæpe multifloris (sub-20 fl.), petalo superiore alis apicem attingentibus obtuso, *fructibus* sine apiculo obtusis *subglobosis*.

Differs from the type in its longer and more floriferous racemes, its blunt upper petal, *with* wings reaching the apex, and its obtuse and *subglobose fruits*.

γ. DECIPIENS, nov. var.

Habitu foliisque typo simillima sed pedicellis recurvatis vel flexuosis, sepalis 4 mm. longis 2½ mm. latis breviter acuminatis, corollâ 11 mm. longâ, *fructibus* typi formâ sed certe *majoribus* cum apiculo 2½ mm. longis.

In habit and foliage resembling the type, but with flexuous, and sometimes recurved pedicels. Sepals 4 mm. long and 2½ mm. broad, shortly acuminate; corolla 11 mm. long; *fruits* in form like the type, but distinctly *larger*, 2½ mm. long, including the apiculus.

Distribution.—*F. muralis* (sensu stricto) is a rather rare and local species in Europe, but it appears to be common in Madeira and the other Atlantic Islands. A fragmentary specimen at the Herb. Mus. Brit. that I think can be referred to no other species is labelled "St. Helena, Cook's First Voyage."

It is also locally abundant in South Africa, and Harvey's statement in the "Flora Capensis," where it is recorded as *F. officinalis* var. *capensis*, that it was introduced from Europe seems exceedingly doubtful. If not native, it is much more probable that it was at some time brought from Madeira or the Canaries.

It occurs in Norway (*Hb. Kew*)! Germany! Holland (*Nyman*), France! Spain (*Hb. Kew*)! Portugal! Algeria (*Haussk.*). Azores! Madeira! Canaries! Ascension! St. Helena! South Africa! Bermuda! Brazil (*Haussk.*).

F. muralis was formerly recorded for many counties in Ireland and is given in Nyman's Conspectus, "Hibernia, pr. Belfast, Corry, 1882." All the Irish specimens that I have seen, however, belong rather to *F. Borœi*, with the doubtful exception of one, which unfortunately shows no fruit, collected at Portadown by Miss McArdle in September, 1904.

I have seen no specimen from the Channel Islands.

In Great Britain *F. muralis* is a distinctly rare plant and seldom typical, and I suspect that even in its few habitats it may have been at some time accidentally introduced.

The vice-counties that I have noted for it are:—

10. *Wight:* Alverstone, May, 1859 (*Hb. A. G. More*)! Shore near Ryde, 1860 (*Hb. Townsend*)! 11. *S. Hants:* Brockenhurst and Bournemouth (*Hb. E. F. Linton*, var. *decipiens*)! 15. *E. Kent:* Cornfield between Ashford and Kennington, 1863, *J. S. Mill* (*Hb. Kew.* var. *decipiens*)! 17. *Surrey:* Fairmile (*Watson* ap. *Haussk.*). 37. *Worcester:* Kidderminster (*Hb. Jacquin* ap. *Haussk.*). 39. *Stafford:* Brereton, *H. P. Reader*, 1900! Oulton Abbey, *H. P. Reader*, 1902! 40. *Salop:* Little Stretton, *A. Ley*, 1909 (var. *decipiens*)! 49. *Carnarvon:* 1829 (*Hb. Mus. Dublin*)! 58. *Cheshire:* near Stockton, 1889 (*Hb. Wolley-Dod*)! 59. *S. Lancs.* Speke (*Hb. A. Bennett.*)!

3b. **F. neglecta,** nov. subsp.

Fumaria annua *robusta, caule* ramoso, *suberecto* vel ascendente, formâ scandente non visâ. Folia irregulariter 2–3 pinnatisecta, foliolis planis viridibus in lobos oblongo-mucronatos lanceolato-acutosve fissis. *Racemi* laxiusculi *multiflori* (sub-20 flori) *pedunculos* rectos *superantes. Bracteæ lineari–oblongæ, cuspidatæ, pedicellis* fructiferis *tenuibus suberectis* paullulum flexuosis *dimidio breviores. Sepala circa* 3 *mm. longa et* 1½–2 *mm. lata, late ovalia,* peltata, *integriuscula* vel inferne paulo dentata, breviter acuminata, præter nervum dorsalem angustum viridem albida vel dilute rosea, aliquanto persistentia, corollæ tubum subæquantia. *Corolla* 10 *mm. longa, rosea; petalo superiore haud lato* dorsum compresso *alis atropurpureis* apicem attingentibus carinam excedentibus spathulato *obtuso*, calcare sepalis longiore; petalo inferiore marginibus erectis angustissimisque; petalis interioribus sursum curvatis apice atropurpureis. *Fructus mediocres,* plus 2 mm. longi ac lati, *brevissime obovati, fere truncati* et inferne angustati, stipite obscuro pedicelli apicem subæquante præditi, paulo compressi sed obscure carinati, siccitate *læves vel leviter rugulosi* minute sed plane bifoveolati.

Hæc subspecies *F. murali*, var. *Lowei* proxima est, sed habitu robustiore, racemis longioribus, pedicellis suberectis, bracteis brevioribus latioribusque, fructibus majoribus plane recedit.

A *F. Boræi* racemis longioribus, bracteis brevioribus, sepalis minoribus, corollis angustioribus minoribusque dignoscitur.

A *F. Gussonei*, Boiss. et *F. Bastardi*, Bor. fructibus lævibus rugulosisve satis differt.

Habitat in Angliâ in agris Gilly Tresamble prope Penryn Cornubiæ occidentalis.

A *robust* and branched *plant, suberect* or ascending, not observed in a rampant state. Leaves irregularly 2–3 pinnatisect, green, with leaflets cut into oblong or lanceolate, mucronate or acute lobes. *Racemes lax and many* (sub-20) *flowered, exceeding* the straight *peduncles. Bracts* linear-oblong, cuspidate, broader than in *F. muralis*, about *half as long as the slender fruiting pedicels*, which though somewhat flexuous are *suberect and never recurved. Sepals about* 3 *mm. long and* 1½–2 *mm. broad, broadly oval*, peltate, *subentire* or with a few shallow teeth round the base, shortly pointed, whitish in colour with a narrow green median line or sometimes suffused with pink, not broader than the corolla-tube, sometimes persisting after the petals have fallen. *Corolla about* 10 *mm. long, pink in colour*, with the tip of the inner petals and the *wings* of the upper one *blackish red. Upper petal hardly broad* though dorsally compressed as in *F. muralis*, and with similar wings, but *obtuse* owing to their spathulate dilation extending to the apex; spur longer than the sepals. *Lower petal with erect* but very narrow *margins. Fruits rather small*, slightly exceeding 2 mm. in length and equally broad, *very shortly obovate* in profile, *almost truncate*, and narrowed below to an obscure fleshy neck about as broad as the tip of the pedicel; moderately compressed laterally but obscurely keeled, and when dry, *smooth or finely rugulose*, with small but well-marked apical pits.

At present only known in one locality at Gilly Tresamble, near Penryn, West Cornwall, where it was discovered on the 25th September, 1907.

3*c*. F. Boræi, subsp.

F. Boræi Jordan in Cat. Gren. (1849) et Pugillus, p. 4 (1852); Boreau, Fl. du Centre de la Fr. ed. 3, p. 34 (1857); Haussknecht in Flora, p. 520 (1873); Rouy and Foucaud, Fl. de Fr., i. p. 173 (1893).

F. Bastardi β major Boreau in Duchartre Rev. Bot. ii. p. 359 (1846).

F. muralis Boreau Fl. du Centre de la Fr. ed. 2, p. 28 (1849) non Sonder.

F. media Lois. var. *typica* in Hamm. Mon. p. 29 (1857).

F. confusa Jord. ap. mult. auct. angl.

Icones.—Hamm. Mon. tab. iii. fig. 3; Journ. Bot. tab. 436, fig. 5.

Exsiccata.—A. Jordan, d'Angers, cult. 1861, Herb. Mus. Brit! Billot, Fl. G. et G. nos. 2209 et bis! F. Schultz, Herb. Norm. no. 1007! E. S. Marshall, nos. 2413 and 2414!

A *plant* of generally *robust* habit and considerably branched, in fields either suberect and compact or more or less diffuse, on hedge-banks and walls usually climbing by its cirrhose petioles, sometimes to a height of 3 or 4 ft. Leaves irregularly 2–3 pinnatisect, light green, with leaflets cut into oblong or broadly cuneiform, acute or mucronate lobes. *Racemes rather lax and not many-flowered* (flowers usually about twelve, rarely exceeding fifteen), nearly *equalling* the *peduncles. Bracts* linear-lanceolate, acuminate, somewhat variable in length, usually *a little less than the fruiting pedicels*, but occasionally much shorter. *Fruiting pedicels of moderate thickness*, normally *straight and erect-spreading* or subpatent, but in rampant plants sometimes flexuous or recurved. *Sepals 4–5 mm. long and 2½–3 mm. broad, ovate,* peltate, occasionally subentire but generally *irregularly dentate* towards the base, acute or shortly acuminate, whitish or rosy in colour, with greenish median line, broader than the corolla-tube, and contiguous below. *Corolla* 10–12 *mm. long, rose-pink* in colour, with the tip of the inner petals and the *wings* of the upper one *blackish-red. Upper petal broad and dorsally compressed, acute, apiculate or rarely obtuse,* with a spathulate dilation of the wings which, exceeding the keel, often extends almost to the apex, and is obvious in the bud stage though obscured when, in flower, the wings reflex upwards and cover the keel; spur shorter than the sepals. *Lower petal with erect* and narrow *margins,* often deflexed and free. *Fruits of moderate size,* about 2½ mm. long, and 2 mm. broad, *obovate and rounded-obtuse* in profile, a little compressed laterally but obscurely keeled, and narrowed below to an obscure fleshy neck not broader than the tip of the pedicel; *smooth or finely rugulose* when dry, with small but distinct apical pits.

Forma *rubens.*

F. Borœi var. *verna* Pugsley in Journ. Bot. xl. p. 177, non Clavaud.

Habitu typi, sed foliis parvis rubicundis, sepalis rubris, corollâ magnâ speciosâ saltem 12 mm. longâ profunde roseâ petali superioris alis latis atropurpureis.

In habit resembling the type, but with small, vinous-tinted foliage. Flowers large and handsome, fully 12 mm. long, and deep rose-coloured, with rosy-red sepals, and broad, blackish-red wings to the upper petal.

Forma *elongata.*

Ut in typo robusta sed laxa internodis longis diffusa; folia plus minusve glauca; racemi pauciflori (sæpissime sub-10 flori).

As robust as the type, but very lax and diffuse, with long internodes and more or less glaucous foliage. Racemes rather few (usually sub-10) flowered.

β. AMBIGUA Pugsley in Journ. Bot. xl. p. 178.

In habit similar to the type, but with narrower, lanceolate leaf-segments, rather smaller flowers, and narrower, more acuminate sepals. *Fruit* nearly 2½ mm. long, and almost as broad, more compressed laterally than in other forms of *F. Borœi,* hardly narrowed below, and consequently *nearly square* rather than obovate in profile, with a fleshy *neck equalling* or overlapping the *tip of the pedicel*; when dry, finely rugulose with rather faint apical pits.

γ. GRACILIS, nov. var.

F. muralis auct. angl. (ex parte) non Sonder.

F. Borœi var. *muraliformis* Pugsley in Journ. Bot. xl. p. 177, non Clavaud.

Habitu gracili et scandente, ut in *F. murali,* sed interdum robustiore. Folia laciniis oblongo-lanceolatis sæpissime ampla. Pedunculi incurvati et paulo graciles. *Bracteæ* saltem inferiores, *pedicellos* fructiferos *graciles nunc rectos* subpatentes divaricatosve *nunc flexuosos vel recurvatos æquantes. Sepala* 4–5 *mm. longa*, acuminata. Corolla 10–11 mm. longa, sæpe pallide rosea, petalo superiore acuto et quam in typo angustiore. Typi fructus.

Of *slender*, climbing *habit* like *F. muralis*, but sometimes more vigorous and growing to a larger size. Foliage usually ample, with oblong-lanceolate leaf-segments. Peduncles incurved and rather slender. *Bracts*, or at least the lowest, *as long as the fruiting pedicels*, which are *slender* and very *variable in direction*, even on the same individual plant, sometimes straight and erect-spreading or divaricate, sometimes flexuous or even recurved almost as in *F. capreolata*. *Sepals* 4–5 *mm. long*, acuminate. Corolla 10–11 mm. long, often pale in colour, with the upper petal acute and narrower than in the type. Fruit much as in the type.

δ. BRITANNICA, nov. var.

F. muralis auct. angl. ex parte, non Sonder.

F. Borœi var. *serotina* Pugsley in Journ. Bot. xl. p. 177, non Clavaud.

Habitu laxo, scandente et *gracili*, sed minus quam in *F. murali*. Folia quam in typo sæpe minora. Pedunculi pedicellique graciles. *Sepala* 3–4 *mm. longa*, 2–2¾ mm. lata, vix acuminata. Corolla rarò plus 10 mm. longa, sæpissime pallide rosea. *Fructus* circa 2 mm. longi, latitudine paululum minores, *subrotundo-obovati* vix compressi stipite obscuro quam pedicelli apex minore præditi, in vivo ante maturitatem interdum subapiculati. Medium inter *F. Borœi* et *F. muralem* fere tenet.

Habit slender and climbing or diffuse, but less so than in *F. muralis*, although often with long internodes. Foliage frequently smaller and more glaucescent than in the type. Peduncles and pedicels slender. *Sepals* 3–4 *mm. long*, and 2–2¾ mm. broad, acute but scarcely acuminate. Corolla rarely exceeding 10 mm. in length, usually rather pale. *Fruit* about 2 mm. long and nearly as broad, *subrotund-obovate* in profile, but little laterally compressed and narrowed below to an obscure neck less in width than the tip of the pedicel; when fresh, sometimes subapiculate before maturity.

Sub-var. *longibracteata*.

Racemis paucifloris pedunculos haud æquantibus, bracteis pedicellos fructiferos breves superantibus, sepalis acuminatis a varietate *britannicâ* differt.

Racemes few-flowered, not equalling the peduncles. Fruiting pedicels stout and short, exceeded by the subtending bracts. Sepals acuminate.

Sub-var *sarniensis*.

Habitu suberecto ramosissimo, racemis brevioribus densioribus, fructibus prope globosis.

Suberect in habit and much branched. Racemes relatively short and dense. Fruit nearly globose.

Distribution.—Norway (*Haussk.*). Sweden (*Haussk.*). Germany (*Haussk.*). France! Spain (*Hb. Kew*)! Portugal (*Haussk.*). Sardinia (*Haussk.*). Morocco (*Haussk.*). Algeria (*Haussk.*). Madeira (*Haussk.*).

Very few foreign specimens of *F. Boræi* exist either at Kew or the British Museum, and I think the record of its occurrence in Madeira may well be questioned.

F. Boræi is common in the Channel Islands, the sub-variety *sarniensis* being apparently confined to Guernsey. In Ireland it is shown by Mr. Praeger's list to be widely spread.

In Great Britain it is certainly the most generally distributed and most abundant of the large-flowered forms, flourishing on all kinds of waste and cultivated ground, as well as on hedgebanks and old walls, and sometimes growing in such profusion as to suffuse whole fields with the ruddy hue of its flowers.

The vice-counties for which I have noted this subspecies are as follows:—

1. *W. Cornwall:* Scilly and Falmouth (*Hb. Mus. Brit.*)! Penzance!! Ponsanooth, *F. H. Davey*, 1905 (with f. *rubens*, var. *gracilis*, and var. *britannica*)! Par (with var. *gracilis*)!! Truro (var. *britannica*)! 2. *E. Cornwall:* Fowey, 1906, *Mrs. Graham*! Seaton Valley, *T. Archer Briggs* (*Hb. Mus. Brit.*)! Tintagel (*Herb. L. B. Hall*)! 3. *S. Devon:* near Plymouth (*Hb. Mus. Brit.*)! Budleigh Salterton (*Hb. Mus. Brit.*)! Torquay!! Dawlish (*Hb. E. S. Marshall*, f. *rubens*)! 4. *N. Devon:* Lynton!! Ilfracombe (with var. *ambigua* and var. *britannica*)!! Woolacombe (with var. *ambigua*)!! 5. *S. Somerset:* W. Monkton, 1905, *E. S. Marshall* (var. *britannica*)! Minehead (with f. *elongata* and var. *ambigua*)!! 6. *N. Somerset:* Wells (*Hb. Mus. Brit.*)! 9. *Dorset:* Wareham!! Poole!! Swanage!! 10. *Wight:* near Cockleton (*Hb. Mus. Brit.*)! 11. *S. Hants:* Wick (var. *gracilis*)!! 13. *W. Sussex:* Henfield (*Hb. C. E. Salmon*)! Selsey!! 14. *E. Sussex:* Bexhill, *F. C. S. Roper* (*Hb. Mus. Brit.*)! Catsfield, *E. S. Salmon* (var. *britannica*)! Guestling, *Rev. Bloomfield*, 1905 (var. *ambigua* and var. *britannica*)! 15. *E. Kent:* Ham Street, *E. S. Marshall* (*Hb. Mus. Brit.*)! 17. *Surrey:* Barnes (var. *gracilis*)!! Bookham (*Bickeno* in *Hb. Riddelsdell*, var. *gracilis*)! 21. *Middlesex:* Fulwell, *W. T. Dyer* (*Hb. Mus. Brit.*)! 23. *Oxford:* Bullingdon, *G. C. Druce* (*Hb. Mus. Brit.*)! 25. *E. Suffolk:* near Yarmouth (*Hb. Mus. Brit.*)! 27. *E. Norfolk:* Ormsby *Hb. Druce*)! 33. *E. Gloster:* Gloucester (*Hb. St. Brody*)! 34. *W. Gloster:* Lydney (*Hb. Mus. Brit.*)! 35. *Monmouth:* Llandogo, *A. Ley* (*Hb. Mus. Brit.*)! 36. *Hereford:* Downton (*Hb. Bickham*)! King's Caple (*Hb. Mus. Brit.*)! 37. *Worcester:* Upton-on-Severn (*Hb. Bickham*)! 40. *Salop:* Shrewsbury, *W. Moyle Rogers* (*Hb. Mus. Brit.*)! Shipwell (*Hb. Watson*)! 41. *Glamorgan:* Llandaff, *H. J. Riddelsdell*, 1910! 43. *Radnor:* Rhayader (*Hb. Mus. Brit.*)! Erwood, 1907, *A. Ley*! 45. *Pembroke:* Kilgerran (*Hb. Mus. Brit.*)! St. Davids, *E. F. Linton*, 1905 (var. *gracilis*)! 46. *Cardigan:* Aberystwyth!! 48. *Merioneth:* Bryn-y-glas (*Hb. Mus. Brit.*)! 49. *Carnarvon:* Llanfairfechan

(sub-var. *longibracteata*)!! 50. *Denbigh :* Llangollen (*Hb. Mus. Brit.*)! 55. *Leicester :* near Swithland, *W. Bell*! (locally known as "Little Dill"). 58. *Cheshire :* Sale Moor (*Hb. Townsend*)! 59. *S. Lancs :* Burnley (*Hb. Watson*)! 60. *W. Lancs :* Little Eccleston (*Hb. Mus. Brit.*)! 63. *S. W. Yorks :* Huddersfield and Doncaster (*Hb. Mus. Brit.*)! 69. *Westmoreland and Lake Lancs :* Rosshead (*Hb. Mus. Brit.*)! Hawkshead (*Hb. Watson*)! 70. *Cumberland :* Keswick (*Hb. Mus. Brit.*)! 72. *Dumfries* (*Hb. Watson*)! 73. *Kirkcudbright* (*Hb. Mus. Brit.*)! 74. *Wigton* (*Hb. Druce*)! 79. *Selkirk* (*Hb. Druce*)! 80. *Roxburgh :* Ednam (*Hb. Mus. Brit.*)! Melrose (*Hb. C. E. Palmer*)! 81. *Berwick* (*Hb. Somerville*)! Cockburnspath, *F. C. Crawford*, 1902! 82. *Haddington :* Aberledy (*Hb. Boswell*)! 83. *Edinburgh* (*Hb. Watson*)! 85. *Fife :* Balmuto, *J. Boswell-Syme*, 1874 (*Hb. Mus. Brit.*)! 86. *Stirling* (*Hb. Mus. Brit.*)! 87. *W. Perth :* Clackmannan (*Hb. Bickham*)! 100. *Clyde Is. :* Arran, *E. S. Marshall*, no. 2507! 108. *W. Sutherland :* Tongue, *E. S. Marshall*, no. 2414! 111. *Orkney :* Mainland, *E. S. Marshall*, no. 2413!

In addition to these vice-counties it is probable that the following have also been correctly recorded in *Topographical Botany* and its Supplement as habitats for this plant, *viz.* :—

29. *Cambridge.* 42. *Brecon.* 44. *Carmarthen.* 47. *Montgomery.* 52. *Anglesea.* 62. *N. E. Yorks.* 65. *N. W. Yorks.* 66. *Durham.* 67. *S. Northumberland.* 76. *Renfrew.* 77. *Lanark.* 88. *Mid Perth.* 89. *E. Perth.* 101. *Cantire.* 105. *W. Ross.*

× FUMARIA PAINTERI.

In the latter part of 1905 a parcel of fumitories from the Shrewsbury Museum was sent me for examination by the late Rev. W. H. Painter, among which was a distinct and peculiar plant (labelled *F. confusa* Jord.) that he had himself collected nine years earlier near Bishop's Castle, in the county of Salop. This specimen bore a certain resemblance to *F. Boræi*, and especially to the variety *ambigua*, but differed entirely from all the large-flowered species known in Britain by its truncate and persistently apiculate fruits. As these fruits were not all perfect, I concluded the plant must be a hybrid, its parentage being probably *F. Boræi* × *officinalis.*

About two years afterwards Mr. Painter again sent me several sheets of the same form which he had collected in 1907 at Iron Bridge, in the eastern part of the same county. These specimens were quite uniform and showed very few abortive fruits, and such seeds as were exposed by the cracking of capsules in the press appeared perfectly developed. Mr. Painter was unfortunately unable to remember whether all of these specimens were taken from one very large plant, or whether the form was more or less prevalent where he met with it; but the occurrence of so distinct a *Fumaria*—not barren, as hybrids of this genus usually are—points to its not being a direct hybrid, but rather a form of hybrid origin which may have become established over a wide area. It is even possible that further investigation may render its hybridity altogether doubtful. In these circumstance I propose to describe the plant as a presumable hybrid, and name it after Mr. Painter, the original collector.

If this assumption be correct, there can be no doubt that one of the parents is *F. officinalis*, this species being equally traceable in the narrow, laciniate sepals, the spathulate lower petal, and the almost retuse fruits. The other factor I believe to be *F. Boræi*, but it is just possible that it is really *F. purpurea*, a species which grows to my knowledge in several places in Shropshire. I place the plant as a hybrid after *F. Boræi*, however, with very little hesitation, as it exhibits but scant traces of the features characteristic of the *Capreolatæ*, and, when considered in all its points, can certainly only stand among the *murales*.

The description of this plant is as follows, *viz.*:—

FUMARIA PAINTERI, nova hybrida.
F. officinalis L. × *F. Boræi* Jord.?

Fumaria annua ramosa, *habitu robusto* et scandente. Folia 2–3 pinnatisecta, foliolis planis, in lobos oblongos mucronatos vel lanceolatos acutos quam in *F. Boræi* paulo angustiores fissis. *Racemi* laxiusculi, *multiflori* (circa 20-flori), *pedunculos* breviusculos *superantes*. *Bracteæ* lineari-lanceolatæ, acuminatæ, *pedicellos fructiferos erecto-patentes* rectos vel paulo flexuosos apice satis incrassatos *subæquantes*. *Sepala* 3–3½ *mm. longa*, 1½ *mm. lata*, *ovato-lanceolata*, acuminata, peltata, inferne *laciniata* vel irregulariter dentata, sed apicem versus integriuscula, præter nervum dorsalem viridiusculum albida. *Corolla* 10–11 *mm. longa*, pallide *rosea*; *petalo superiore* dorsum compresso, *obtuso vel apiculato*, *alis atropurpureis* tandem reflexis carinam excedentibus et apicem subtruncatum attingentibus spathulato; *petalo inferiore marginibus* angustis sed *patulis* et superne paulo dilatatis *subspathulato*; petalis interioribus sursum curvatis apice atropurpureis. *Fructus mediocres*, 2½ mm. longi ac lati, *subrotundo-quadrati*, *cum apiculo* brevi sed *persistente truncati* vel etiam subemarginati, paulo compressi sed obscure carinati, in stipitem obscurum pedicelli apicem subæquantem breviter angustati, siccitate apicis foveolis obscuris sed latiusculis *leviter rugulosi*.

A plant of *robust* and rampant *habit*, considerably branched. Leaves 2–3 pinnatisect, with flat leaflets cut into oblong or lanceolate, mucronate or acute lobes, rather narrower than those of *F. Boræi*. *Racemes* rather lax, *many-* (about twenty) *flowered*, *exceeding* the rather short *peduncles*. *Bracts* linear-lanceolate, acuminate, *nearly equalling the fruiting pedicels*, which are *erect-spreading*, straight or somewhat flexuous, and moderately thickened at the apex. *Sepals* 3–3½ *mm. long*, 1½ *mm. broad*, *ovate-lanceolate*, acuminate, peltate, *laciniate* or irregularly dentate in the lower half but becoming entire towards the apex, whitish in colour, with green median line. *Corolla* 10–11 *mm. long*, *pale pink in colour*, with the tip of the inner petals and *wings* of the upper one *blackish red*. *Upper petal* dorsally compressed, *obtuse or apicu-*

late, with a spathulate dilation of the wings which, when reflexed, cover the abruptly terminated keel. *Lower petal with* narrow and *spreading margins*, which are somewhat dilated towards the apex, *forming a subspathulate outline.* Inner petals curved upwards. *Fruit of moderate size*, 2½ mm. long and equally broad, *squarish in profile, truncate* or even subemarginate, *with* a short but *persistent apiculus*, laterally compressed but obscurely keeled, and shortly narrowed below to an obscure fleshy neck about as broad as the tip of the pedicel; when dry, *faintly rugulose*, with shallow but rather broad apical pits.

4. FUMARIA PARADOXA, nov. spec.

The handsome fumitory for which the above name is proposed was first brought to my notice in October, 1904, by Mr. F. H. Davey, who sent for identification fresh specimens gathered in cultivated fields at Gilly Tresamble, in the neighbourhood of Penryn, in West Cornwall. On examining this material, I found that, while differing from the British Fumitories, it somewhat resembled certain specimens at the British Museum and agreed in most respects with Jordan's account of his *F. vagans.* I was unable, however, to identify it with this or any described species, and as the plant, which Mr. Davey at first thought grew also at Perranzabuloe, could afterwards be found only at Gilly Tresamble, its occurrence in such a restricted habitat led me to suspect it to be a recent introduction which would presently be recognized as occurring on the Continent. Further specimens were sent me by Mr. Davey in the autumn of the following year, and in September, 1907, I availed myself of an opportunity to visit Gilly Tresamble in his company, in order to see the plant *in situ.* At that date it was growing sparingly in two fields, accompanied by *F. Boræi*, *F. Bastardi*, and the other new form already mentioned in this paper, *F. neglecta.*

In the summer of 1909 I received a fumitory through the Berlin Exchange Club, which, though showing no fruits, seemed identical with this Cornish plant. It was sent out as *F. affinis* Hoff. (*sic*), and had been collected in April, 1906, by Señor B. Vicioso at Calatayud, in the Spanish province of Aragon. Señor Vicioso has since been kind enough to furnish me with further material of this plant, collected early in 1910, which leaves no doubt as to its identity with the Cornish form, and on re-examining the two with the specimens in Herb. Mus. Brit., I recognize that they both belong to the same species as a very fine example there, showing abundant flowers and fruit, labelled "E. Bourgeau, Pl. d'Espagne, 1863. *Fumaria Bastardi* Bor. (Coss.), Champs incultes près Navalmoral, 10 Mai."

The salient features of the three plants are the long, lax racemes of showy flowers, borne on arcuate-decurved pedicels recalling those of *F. capreolata*; the subentire, oval sepals; and the nearly smooth fruits of at least moderate size and somewhat *muralis*-like form. The finest flowers are those of the Navalmoral specimen, in which the corollas attain a length of 13 mm., but the Cornish plant, as I saw it in 1907, was almost equally good, although in 1904 and 1905 the largest corollas did not exceed 12½ mm. Señor Vicioso's specimens are likewise variable in the size of their flowers, which, on an average, are smaller than in the British examples and rarely exceed 12 mm. in length. His plants were collected early in the season, and are mostly quite small—apparently the product of open fallows on poor, dry soil—and the flowers, though uniformly well developed, are only about 11 mm. long in the weaker examples, and when, as in some cases, the characteristic recurving of the pedicels is lacking, they bear a great resemblance to *F. Gussonei.* The fruits of all these Calatayud plants have unfortunately been crushed in the press, and consequently they cannot be accurately diagnosed with certainty; but the remains show that they are subacute, of medium size and with little rugosity, and hence practically identical with those of the Navalmoral specimen. These latter are uniform in size and shape, but while the majority appear quite smooth, the most mature are clearly rugulose. Similar fruit-characters are also obvious in the Cornish specimens, but in Britain the fruits, though never clearly rugulose, evidently vary in size and form, for while in Bourgeau's plant and Mr. Davey's first example they are scarcely separable, in the plants that I collected in 1907 they are appreciably larger and less acute.

It will be seen that the name under which Bourgeau's plant was sent out—*F. Bastardi* Bor.—is untenable, inasmuch as this, in the type, is a species with rugose fruit, which, as will be shown, is synonymous with *F. confusa* Jord., while its variety *β major* is demonstrably *F. Boræi.* Haussknecht, judging from the specimen in the Vienna Herbarium, and seemingly guided by the form of the fruit, refers the plant to *F. muralis*, but the floral characters of the two are widely different in several respects, and I think they cannot possibly be united as one species. In Willkomm and Lange's *Flora Hispanica*, iii. p. 881, all the Spanish forms of this subsection are placed under *F. media* Lois., which stands as a. *Gussonei*, b. *affinis* (= *F. affinis* Hamm. = *F. vagans* Jord. ex spec. authen.), c. *Boræi*, d. *apiculata*, and e. *muralis*; and the Navalmoral plant, though not placed under any of these varieties, is mentioned as having been wrongly referred by Haussknecht to *F. muralis.* The variety to which it seems most nearly related, and to which the Calatayud plant has been referred is b. *affinis*, an identification which, however, appears inadmissible, inasmuch as Hammar describes and figures his *F. affinis* (of which I have seen no authentic specimen) as having tuberculate-rugose fruit and serrately toothed sepals. *F. affinis* is regarded by Haussknecht as a large-flowered form of *F. Gussonei.* It is equally certain, notwithstanding the terms of Jordan's description, that Bourgeau's plant cannot be named *F. vagans*, for of this the British Museum possesses two specimens named by Jordan in fair preservation which are quite different, and not easily separable from that author's *F. confusa.*

From the other named forms of the subsection *mediæ* the plant under discussion is equally distinct, and it has no claims to a place among the *Capreolatæ* or the *Agrariæ*. I therefore think it can only be regarded as a new species, occupying a position somewhat intermediate between the smooth fruited species of the *Mediæ*, which it resembles in its fruit characters, and the rugose fruited forms, which it approaches in the general form of its flowers.

Cornish specimens of this plant collected by Mr. Davey were distributed (unnamed) through the Watson Exchange Club during the winters of 1904 and 1905, and in the latter year also through the Exchange Club of the British Isles.

The description, &c., of this plant is as follows :—

F. paradoxa, nov. sp.

Exsiccata. E. Bourgeau, Pl. d'Espagne, 1863 : Navalmoral, 10 Mai. Herb. Mus. Brit. (as *F. Bastardi* Bor.)!

Fumaria annua, sæpius plus minusve *robusta*, basi ramosa, aliquanto petiolis cirrhosis scandens. Folia irregulariter 2–3 pinnatisecta, sæpissime *foliolis parvis* in lobos oblongos plus minusve acutos vel cuneiformes mucronatos fissis. *Racemi laxi* et plerumque *multiflori* (raro plus-20 flori), in plantis robustis *pedunculos* conspicue breves multo *superantes*. *Bracteæ* lineari-oblongæ, cuspidatæ, *pedicellis* fructiferis *subduplo breviores*. *Pedicelli* paulo *tenues* et sæpissime longi, *floriferi* sæpe *arcuato-deflexi* fere ut in *F. capreolatâ*, *fructiferi* recti vel flexuosi, *erecto-patentes* vel divaricati. *Sepala* 3–5 (sæpius 4) *mm. longa*, 1½–2½ (sæpius 2) *mm. lata*, *ovalia*, peltata, acuta, *integriuscula* vel basi paucidentata, præter nervum dorsalem sæpe obscurum *albida* vel subrosea, corollæ tubo paulo angustiora. *Corolla* 11–13 *mm. longa*, *rosea* ; *petalo superiore latiusculo*, dorsum haud compresso, plerumque *subacuto* apiculatove, *alis atropurpureis* reflexis *apicem raro attingentibus* sed carinam æquantibus vel paulo superantibus prædito ; *petalo inferiore* subacuto vel apiculato *marginibus angustissimis patulis* sæpe libero deflexo ; petalis interioribus sursum curvatis, apice atropurpureis. *Fructus mediocres aut majusculi*, 2½–2¾ mm. longi et 2⅛–2½ mm. lati, *subrotundi*, circa medium latissimi, superne in *apicem* brevissimum *in vivo acutum sed interdum in sicco rotundatum* inferne in stipitem obscurissimum quam pedicelli apex paulo angustiorem fere æqualiter angustati, paululum compressi sed obscure carinati, siccitate apicis foveolis majusculis et satis distinctis *sublæves vel* interdum in maturitate *rugulosi*.

Habitat in Hispaniâ prope Navalmoral et Calatayud, in Angliâ in agris Gilly Tresamble prope Penryn Cornubiæ occidentalis et forsan in Hiberniâ.

A plant of generally *more or less robust* habit, branched from the base and sometimes climbing by its twisted petioles. Leaves irregularly 2–3 pinnatisect, generally cut into *small leaflets* with oblong or cuneiform, more or less acute, or sometimes mucronate lobes. *Racemes lax* and usually *many* (rarely more than 20) *flowered*, in strong plants much *exceeding* the very short *peduncles*. *Bracts* linear-oblong, cuspidate, *one-half to two-thirds as long as* *the fruiting pedicels. Pedicels* rather *slender* and often long, *in flower* generally *arcuate-deflexed* almost as in *F. capreolata, in fruit* straight or flexuous, *erect-spreading* or divaricate. *Sepals* 3–5 (commonly 4) *mm. long,* 1½–2½ (commonly 2) *mm. broad, oval,* peltate, acute, *subentire,* or with a little shallow toothing about the base, whitish or rosy in colour, with the median line often obscure, rather narrower than the corolla-tube. *Corolla* 11–13 *mm. long, rose-pink* in colour, with the tip of the inner petals and the *wings* of the upper one *blackish-red. Upper petal* rather *broad* but not dorsally compressed, generally *subacute* or apiculate, with reflexed wings rarely reaching the apex, but equalling or somewhat exceeding the keel. *Lower petal* subacute or apiculate, *with very narrow spreading margins,* often deflexed and free. *Fruits of moderate size or rather large,* 2½–2¾ mm. long and 2⅛–2½ mm. broad, *subrotund* in profile, broadest about the middle, and almost equally narrowed above and below to a very short *apex, which is acute when fresh, but sometimes rounded when dry,* and an almost obsolete neck, slightly narrower than the tip of the pedicel; little compressed laterally and obscurely keeled; *nearly smooth* when dry *or* sometimes, when quite mature, *rugulose,* with distinct and rather large, though shallow, apical pits.

F. paradoxa may be distinguished from *F. muralis* by its more robust habit, many-flowered, lax, and short-peduncled racemes, larger flowers, generally recurved on the pedicels, and larger, less uniformly smooth fruits. Its long racemes similarly separate it from *F. Borœi,* which also differs essentially in its larger, ovate, toothed sepals, and obovate, obtuse fruits. *F. neglecta* presents a marked contrast in its small and obtuse flowers, and smaller, almost truncate fruits.

Of *F. sepium* I have seen no authentic specimen, but it is no doubt a species widely separated by its more climbing habit, short, few-flowered racemes, long bracts, and lanceolate sepals.

I have likewise been unable to examine any example of the Algerian species, *F. Munbyi,* which resembles *F. paradoxa* in its long racemes of large flowers. The narrow leaf-segments ascribed to it, in conjunction with toothed sepals and very small, compressed fruits, suffice, however, to show that it must be a different species; and similar leaf and fruit characters serve in a still wider degree to differentiate *F. Reuteri.*

From the forms united by Haussknecht under *F. Gussonei, F. paradoxa* differs chiefly in its subentire sepals and its smooth or rugulose instead of rugose fruits. Its leaflets are also somewhat broader, the upper petal is less laterally compressed, the margins of the lower petal are narrower, and no *Gussonei* form bears such large flowers, with the possible exception of *F. affinis.*

All the species of the *Capreolatæ* are characterised by much longer peduncles and larger sepals; and the *Agrariæ* differ widely in the much broader margins of the lower petal and the tubercular-rugose fruits.

Distribution.—On the Continent *F. paradoxa* is at present known in two localities only in the interior of Spain, *viz.* Navalmoral, in the province of Estremadura, and Calatayud, in Aragon; but it is highly probable that it will be found in other districts in that country.

In Britain its one certain habitat is Gilly Tresamble, in West Cornwall, where I have supposed it to be an introduced plant which, I am afraid, may be easily exterminated. A fragmentary specimen in my herbarium without any fruit, received with *F. Bastardi* and labelled " Sleeveen, near Middleton, Co. Cork. Comm. Miss Knowles, Oct. 1906," may, however, belong to this species, and if its occurrence as an established form in the county of Cork is confirmed, a reconsideration of its status in Cornwall may become necessary.*

** Fruit rugose when dry, but sometimes obscurely so before maturity.

5. FUMARIA BASTARDI Boreau.

The Fumitory to be discussed under this name appears to have been first distinguished in Britain by Mitten, who published in

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[* Since the above account of this plant was written, statements have appeared in the Reports of the two Botanical Exchange Clubs that it has been identified by Professors Schinz, Ascherson, and Gräbner, and by Dr. Fedde, as *Fumaria major* Badarro—a determination which leads me to think that these botanists can never have really examined it.

As has been shown, *F. paradoxa* clearly belongs, both by the form of its flowers and its fruit, to the subsection *Mediæ* of the genus, while *F. major*, by the common consent of authors, is one of the most characteristic species of the *Agrariæ*. In the original description of *F. major* (Badarro in Moretti, Bot. Ital. p. 10 (1826)) the *Agraria* type of lower petal is alluded to ("petalo inferiore lineari, apice spathulato-dilatato"), and by Parlatore, Hammar, Haussknecht, Rouy and Foucaud, and Nicotra alike, the plant has been closely associated with *F. agraria* Lagasca, whose features have served as a type for a section or subsection of the genus.

F. major, of which there is good material both at Kew and in Herb. Brit. Mus., may be contrasted with *F. paradoxa* thus:—

F. major.	*F. paradoxa.*
Habit very robust.	Habit less robust, with broader leaf-segments.
Racemes rarely more than 12 flowered.	Racemes usually 15–20 flowered.
Bracts acuminate, subequalling the much thickened, suberect fruiting pedicels.	Bracts broader, cuspidate, ½–⅔ as long as the rather slender, erect-spreading fruiting pedicels.
Sepals about 3 mm. long and 1½ mm. broad, ovate-lanceolate, acuminate, incise-dentate below.	Sepals about 4 mm. long and 2 mm. broad, oval, acute, subentire.
Corolla 12–14 mm. long, with obtuse and broadly winged upper petal.	Corolla 11–13 mm. long, with subacute and less broadly winged upper petal.
Lower petal with broad, subspathulate, spreading margins.	Lower petal with very narrow, spreading margins.
Fruit large, subrotund-obovate, very obtuse, shortly mucronate, when dry densely tubercular-rugose.	Fruit of moderate size, subrotund, generally subacute, when dry smooth or finely rugulose.

It is perhaps a curious coincidence that Hammar, when describing in his monograph *F. affinis*, which may be regarded as intermediate in its characters between *F. major* and *F. paradoxa*, specially warns his readers against confounding it with the superficially similar *F. major*.]

1848, in Lond. Journ. Bot. p. 556, an account of a plant in Borrer's herbarium, collected at Tintagel, which he referred to *F. agraria* Lagasca, but which is shown by Borrer's specimen in the Herb. Mus. Brit. to belong to this species. In the following year Babington reported in Henfrey's *Botanical Gazette*, p. 61, that he saw the same Fumitory in plenty on the Carnarvonshire coast, where *F. Bastardi* is still abundant; and in the third edition of the *Manual* (1851) *F. agraria* Bab. (sic) was made a synonym of *F. capreolata* L., var. γ *media*, which was afterwards identified, and apparently correctly, with *F. confusa* Jordan.

In subsequent years the name *F. confusa* continued to find a place in our text-books, but the essential characters of the plant were lost sight of, with the result that *F. Borœi* commonly came to do duty for it in British botany until the publication of my paper on these plants in Journ. Bot. 1902.

The adoption of the name *F. confusa* Jord. for this plant set aside at least three earlier names under which it was probably included. Two of these, *F. media* Lois. and *F. Petteri* Reichb., are of very doubtful application, and, although used by Hammar, have both been abandoned by most subsequent authors. The third, however, *F. Bastardi* Boreau, appears tenable. It was published in Duchartre's *Revue Botanique*, ii. p. 359 (1846–7), the description being essentially as follows, *viz.*:—

"Pedicelles . . . . dressés ou étalés, non recourbés; sépales ovales, ... denticulés, dépassant à peine la largeur de la corolle; fleurs grêles, d'un blanc rosé mêlé de verdâtre, rouges au sommet; éperon allongé . . .; capsule orbiculaire, rugueuse, très-obtuse. . . .

"β *major*. Fleurs moitié plus grandes, d'un rose plus prononcé, très-foncé au sommet; sépales plus fortement dentés; quelques pédicelles tendent à se recourber; capsule du type . . ."

The description of the type is applicable, so far as it goes, to the plant usually referred to *F. confusa*, and was made more exact by Boreau in the second and third editions of the *Flore du Centre de la France* (1849 and 1857), where *F. confusa* Jord. is quoted as a synonym.

Jordan's account of *F. confusa* was published in 1848 in his *Catalogue des graines récoltées au Jardin botanique de Dijon*, and is reprinted in *Linnæa*, v. 23, p. 469. The salient features of his description are:—"Sepalis . . . . (corollâ) triplo brevioribus in fructu juniore sæpe persistentibus . . . calcare elongato . . . fructibus . . . obtusis lævibus vel demum paulisper rugulosis, basi fructus latissimâ . . . pedicelloque conspicue latiore"; and in contrasting his plant with *F. Bastardi* Bor. in Duchartre's Rev. Bot. he assumes that that plant is what was afterwards known as *F. Borœi*, which name he proposed for it the following year in his account of *F. vagans* in the similar Grenoble Catalogue. In consequence of this *F. Bastardi* Bor. in Duch. Rev. Bot. has been quoted as a synonym of *F. Borœi* Jord., and *F. Bastardi* Bor. Fl. du Centre, eds. 2 and 3, as the equivalent of *F. confusa* Jord.

The principal difference between *F. Bastardi* and *F. confusa*, according to the authors' original diagnoses, lies in the fruit, which in Boreau's plant, both type and variety, is stated to be rugose, while in Jordan's *F. confusa* it should be nearly smooth. But an authentic example of *F. confusa* at Kew shows the fruit to be rugose, and the same character may be seen in a good specimen in the British Museum,—F. Schultz, Herb. Norm. Cont. 7, 605. It fortunately happens that the Kew Herbarium also possesses two specimens of *F. Bastardi*, labelled in Boreau's handwriting, "*F. Bastardi* Bor. Revue, Angers, 1847, A. B.," and "*F. Bastardi β major* Bor. Revue, Angers, 1847, A. B.," which are clearly identical with Jordan's types of *F. confusa* and *F. Boræi* respectively. The labels of these specimens are both annotated "Boreau dedit 30th Sept. 1847," and place beyond question the fact that the type of *F. Bastardi*, which Boreau at first imperfectly described in Duchartre's *Revue*, is the plant which a year later was designated by Jordan *F. confusa*.

In Haussknecht's Monograph both of these names are ignored in favour of *F. Gussonei* Boiss. Diagn. Or. vol. ii. no. 8, p. 13 (1849), on the ground that *F. Bastardi* included more than one species, and *F. confusa* was used to describe a form only. But although Boissier's description may be more satisfactory than any that had preceded it, Boreau's original account of the type of *F. Bastardi* seems sufficiently clear, even without the confirmation of the Kew specimen; and the fact that his var. *β major* was subsequently described as a different plant seems no good reason for ignoring his name *F. Bastardi* as one including more than one species. It may also be doubted whether Haussknecht was right in passing over Jordan's description of *F. confusa* as applicable only to a form, although, it must be admitted, Jordan's characters indicate a weak or cultivated plant, such as his types at Kew and South Kensington actually are.

While differing from Haussknecht, however, in this point of nomenclature, I now agree with him in uniting all the rugose-fruited forms of this group, as far as I know them, under one aggregate species. For this I adopt the name *F. Bastardi* Bor. The plant that I regard as the type and identical with *F. confusa* Jord. is fairly represented both at Kew and the British Museum; and a notable feature of it (besides the rugose fruits), which is apparent in Boreau's specimen and also in Jordan's, is the absence of the usual dark purple colour in the wings of the upper petal—a feature very remarkable when the plant is growing *en masse*, as it imparts to the flowers a general salmon-pink hue in place of the rosy-red tint characteristic of *F. Boræi* and certain other species.

Of *F. affinis* Hamm., I have unfortunately seen no authentic specimen, but there are two fairly good types of *F. vagans* Jord. in Herb. Mus. Brit., and authentic examples of *F. Jordani* Guss. and *F. serotina* Guss. at Kew, while both establishments possess good material of *F. Gussonei* Boiss. All of these plants, in common with the original specimens of *F. Bastardi* and *F. confusa*, are characterised by rather narrow leaf-segments; by relatively short bracts; by small, oval rather than ovate sepals with teeth pointing towards the apex; by a laterally compressed upper petal, with wings produced backwards a considerable distance towards the spur; and by fruits which, if mature, become distinctly rugose when dried. In the living plant the most marked of these features is probably the laterally compressed and long winged corolla, which is quite different from that of every other British species.

The form differing most widely from typical *F. Bastardi*, as I understand it, seems to be *F. Gussonei*, which normally bears smaller flowers, with a dark tipped upper petal and smaller fruits, more rounded above and narrower below. Boissier says of it: "Habitus et florum magnitudo *F. officinalis*, quæ longė differt . . . fructu majore . . . ," and its relationship to typical *F. Bastardi* may be said to be somewhat analogous with that of *F. muralis* and *F. Boræi*. But, on the whole, I think the two rugose-fruited forms present less essential differences, although the colouring of their flowers looks very distinct, and so I place *F. Gussonei* as a variety rather than a subspecies. *F. Gussonei* appears to be the prevalent form of the species in the southern and eastern parts of its range, and the most extreme state that I have seen is from Greece, near its most easterly limit (Heldreich & Halácsy, Fl. Ægea, Insula Melos, 1889).

F. Jordani Guss., so far as I can judge, hardly differs from *F. Gussonei* except in the absence of the dark tip of the upper petal, and I suspect *F. serotina* Guss. to be a shade-form of the same plant.

Jordan's types of *F. vagans*, on the other hand, are nearer to the restricted *F. Bastardi* or *F. confusa*, from which I can only distinguish them by their smaller, more acute, and less broadly necked fruits. I hesitate to separate these even as a variety. Spanish specimens in my herbarium, labelled *F. vagans*, differ again in having a dark-tipped upper petal like *F. Gussonei*.

In Haussknecht's Monograph one variety only of *F. Gussonei* is recognized, var. *patens*, which seems to be a modification of the true plant of Boissier. The species is otherwise divided by the monographer into four forms: a. *typica*, which includes *F. affinis* of Hammar; b. *Jordani*, which is said to be the *F. Jordani* of Gussone; c. *diffusa*, with which original specimens of *F. Bastardi* Bor. and *F. confusa* Jord. are identified; and d. *umbrosa*, to which other examples of *F. confusa* and authentic specimens of *F. vagans* Jord. are referred. In the case of the last two forms the pale coloured flowers are mentioned as a character, but as the size of the corolla in both cases is shown as less than in a. *typica*, it is evident that the specimens examined were abnormal, and either cultivated or shade-grown, in which light Haussknecht apparently regarded them, erroneously supposing the lack of the dark corolla-tip a contingency of environment. That this feature was essentially characteristic of these forms the material at his disposal seems to have afforded no evidence, and he thus mistook a second important point in the corolla of these plants from want of good specimens. In this connection the monographer's remark, "aus England . . . habe ich noch keine Exemplare gesehen" is of interest.

As seen in Great Britain, *F. Bastardi* is a relatively uniform plant, though, when weak or shade-grown, it may have short and few-flowered racemes and fruits whose rugosity, even at maturity, is obscure. In such instances the upper petal, owing to the imperfect development of the wings, may appear acute, and the margins of the lower petal may be nearly obsolete. But, when well-grown, the flowers may reach 12 mm. in length, with broad wings extending to the apex of the upper petal, and clearly marked though narrow spreading margins to the lower one. The broad neck of the fruit, when fresh equalling or even overlapping the tip of the pedicel—a feature which Jordan thought so peculiar—is generally readily seen; but there are gradations, and I have specimens, otherwise typical, from Guernsey, where the base of the fruit is considerably narrowed.

The principal variation from the type occurs in a form which is seemingly common in Ireland, and which I have also seen from a few localities on the west side of Great Britain. This was published as *F. confusa* Jord. var. *hibernica* Pugsley, *in litteris*, by Mr. Praeger in the *Irish Naturalist*, xiv. p. 161 (1905), where its most striking character only is mentioned—the dark-tipped corolla simulating that of *F. Borœi.* The plant may be distinguished, however, not only by the colour of the flowers, but by its lax habit and spare foliage, the narrow wings of its outer petals, and the tendency of its fruits to become more rounded-obtuse and more narrowed below. Some of my specimens seem inseparable from Spanish examples labelled *F. vagans*, except for their laxer habit and larger, more obtuse fruits; and others again approach the Corsican and Italian *F. Gussonei.* But, while varying, they agree exactly with none of these named forms, and on the whole I think the Irish and British plants should be maintained as a separate variety.

In addition to this form I possess another, with smaller flowers and fruit, collected by Mr. Druce in Jersey in 1907, which I am unable to distinguish from the restricted *F. Gussonei* Boiss. That this Mediterranean plant should occur as a native in the Channel Islands is of course improbable, and it is possible that Mr. Druce's specimen may be a hybrid or of hybrid origin (although I can see no evidence of this) with all the features of Boissier's plant. But the distribution of species of *Fumaria*—more or less weeds of cultivation—is frequently difficult to explain, and their occasional dispersal by human agency is well illustrated by the occurrence of both *F. capreolata* and *F. agraria* in widely distant regions in America; and so I think the variety *Gussonei*, which appears to grow in Jersey in company with ordinary *F. Bastardi* and *F. Borœi*, must be admitted into the lists for that island. I believe that specimens of this plant may in some cases have been distributed in 1907 as *F. Bastardi* through the Exchange Club of the British Isles.

The synonymy, description, and distribution of these plants are as follow:—

F. Bastardi (sensu stricto).
Boreau in Duchartre's *Revue Botanique*, ii. p. 359 (1846–7); *Flore du Centre*, ed. 2, p. 28 (1849), and ed. 3, p. 34 (1857).
F. confusa Jordan in Cat. Dijon (1848) et Pugillus, p. 5 (1852); Rouy & Foucaud, Fl. de Fr. i. p. 175 (1893), pro parte.
F. vagans Jord. in Cat. Grenoble (1849); Hamm. Mon. p. 46 (1857); Rouy & Foucaud, Fl. de Fr. i. p. 174, pro parte.
F. media Lois. var. *confusa* Hamm. Mon. p. 29, pro parte.
F. muralis var. *pustulata* Lowe, Fl. Mader. i. p. 14 (1868).
F. Gussonei Boiss., c. *diffusa* and d. *umbrosa* Haussknecht in Flora, pp. 516 *sqq* (1873).

Icones.—Hamm. Mon. tab. vi. fig. 3 (as *F. vagans*). Journ. Bot. xl. tab. 436, fig. 6 (as *F. confusa*, large-flowered form).

Exsiccata.—Billot, Fl. G. et G. no. 3307 bis! and no. 2409 (as *F. vagans*)! F. Schultz, Herb. Norm. Cont. 7, no. 605! E. S. Marshall, no. 2741! Trimen, Tenby, 1867, Herb. Mus. Brit.! W. A. Shoolbred, N. Uist, 1898, Herb. Mus. Brit.!

A plant of moderately robust habit and often much branched, *suberect or diffuse*, but rarely, if ever, climbing to any extent by cirrhose petioles. Leaves irregularly 2–3 pinnatisect, light green or glaucescent, with leaflets cut into oblong, acute, or mucronate lobes, narrower than in *F. muralis*. *Racemes rather lax* and normally *many-* (15–25) *flowered, exceeding* the *peduncles*. *Bracts* linear-oblong, cuspidate, *usually less than half as long as the fruiting pedicels*, but relatively longer when, as sometimes happens, the pedicels are comparatively short. *Fruiting pedicels* generally rather long and slender, *straight and suberect or erect-spreading. Sepals about* 3 *mm. long and* 1½ *mm. broad, oval*, slightly peltate, more or less deeply *serrate*, acute, in colour generally rosy with greenish median line, narrower than the corolla-tube and distant below, often persisting on the young fruit. *Corolla* 10–11 (rarely 12) *mm. long, pink in colour*, with the *tip of the inner petals only blackish red. Upper petal* rather *narrow* above and *laterally compressed*, not spathulate in bud, obtuse or acute according as the wings, which are produced some distance backwards towards the spur and often exceed the keel, extend or not to its somewhat tapering apex; spur longer than the sepals. *Lower petal with* more or less narrow but distinctly *spreading margins. Fruits of moderate size*, about 2½ mm. long and equally broad, rotundate, *subacute or* more rarely *rounded-obtuse*, a little laterally compressed but obscurely keeled, and generally *hardly narrowed below* to an obscure but broad fleshy neck which, when fresh, equals or even overlaps the tip of the pedicel; when dry, *rugose*, but sometimes in weak plants obscurely so, with broad and shallow apical pits.

β Gussonei, nov. var.
F. Gussonei Boiss. Diagn. Or. ii. 8, p. 13 (1849); Jordan, Pugillus, p. 6; Hamm. Mon. p. 34; Rouy & Foucaud, Fl. de Fr. i. p. 175.
F. Gussonei, a. *typica* Haussknecht in Flora, p. 515.

Exsiccata.—M. Lojacono, Plantæ Italiche Selectæ, no 74!

Usually of dwarfer habit than the type with more or less glaucous foliage. *Sepals* 2–3 mm. long and 1–2 mm. broad, often *relatively broader* than in the type. *Corolla 9–10* (rarely 11) *mm. long, with wings of the upper petal,* as well as the tip of the inner ones, *blackish red.* Lower petal with narrower margins than in the type. *Fruits rather small,* about 2 mm. in length and breadth, nearly globular, *rounded-obtuse above and considerably narrowed below*; when dry, rather more finely rugose than in the type, with less conspicuous apical pits.

γ HIBERNICA, nov. var.

F. confusa Jord. var. *hibernica* Pugsley in litt. apud Praeger in *Irish Naturalist,* xiv. p. 161 (1905) (nomen).

Varietas *habitu laxo diffusoque, foliolis* parvis *in lobos* quam in typo breviores et *latiores* fissis. Pedicelli fructiferi sæpissime quam in typo breviores et crassiores; bracteæ paulo longiores. Sepala interdum plus 3 mm. longa. Corolla 9–11 mm. longa, *petali superioris alis atropurpureis. Petala exteriora* alis quam typi paulo angustioribus, *sæpe* carinis attenuatis apiculata vel *acutissima.* Fructus sæpius supra rotundato-obtusi et nonnunquam infra angustati.

A plant of *diffuse* and straggling habit, with sparing foliage and *leaflets* cut into shorter and proportionately *broader segments* than in the type. Fruiting pedicels, on an average, shorter and thicker than in the type, with relatively longer bracts. Sepals sometimes exceeding 3 mm. in length. Corolla 9–11 mm. long, with *wings of the upper petal,* as well as the tip of the inner ones, *blackish red. Outer petals* with rather narrower wings or margins than in the type, and generally apiculate or *very acute,* with attenuate keels. Fruits usually rounded-obtuse above and sometimes narrowed below.

This variety is rather near to *F. vagans,* which differs chiefly in the colouring and form of its flowers and its smaller, subacute fruits, and is doubtfully separable from typical *F. Bastardi.*

The variety *Gussonei* may be distinguished from var. *hibernica* by its dwarfer habit and narrower leaf-segments, as well as by its blunter corollas and smaller fruits.

Distribution. — France! Spain! Corsica (var. *Gussonei*)! Sardinia (var. *Gussonei*)! Italy (var. *Gussonei*)! Sicily (var. *Gussonei*)! Istria (*Haussk.*). Dalmatia (*Haussk.*). Greece (var. *Gussonei*)!

Tunis! Algeria (var. *Gussonei*)! Morocco (*Haussk.*). Madeira!

It will be seen that this is pre-eminently a Mediterranean species.

F. Bastardi is common in the Channel Islands, the variety *Gussonei* occurring with the type in Jersey. It is also widely distributed in Ireland, both as the type and as var. *hibernica.* In Great Britain it extends from West Cornwall to Orkney, but is much more local and less abundant than *F. Boræi.* Being of less variable and less rampant habit it is not met with in such a variety of situations, and is generally a plant of gardens or cultivated fields, and rarely seen on walls or hedge-banks.

The vice-counties for which I have noted this species are as follows:—

1. *W. Cornwall:* Lizard!! Penzance!! Scilly (*Hb. Druce*)! Scilly (*Hb. Townsend*, var. *hibernica*)! Swanpool (var. *hibernica*)!! 2. *E. Cornwall:* Fowey, 1906, *Mrs. Graham*! Boscastle, 1907, *L. B. Hall* (with var. *hibernica*)! Par (var. *hibernica*)!! 3. *S. Devon:* Plymouth (*Hb. Druce*)! 4. *N. Devon:* Appledore (*Hb. Hiern*)! Morthoe!! Ilfracombe!! 5. *S. Somerset:* Dunster!! 9. *Dorset:* Poole (*Hb. Mus. Dublin*)! 11. *S. Hants:* Mudeford (*Hb. Groves*)! Christchurch (*Hb. Mus. Dublin*)! Porchester!! 12. *N. Hants:* Odiham (*Bot. Exch. Club*, 1903)! 13. *W. Sussex:* Hove (*Hb. C. E. Salmon*)! 14. *E. Sussex:* Uckfield (*Hb. A. B. Jackson*)! 15. *E. Kent:* Stourmouth, *E. S. Marshall* (*Hb. Mus. Brit.*)! Near Maidstone, 1854 (*Hb. Townsend*)! 34. *W. Gloster:* Lydney, 1909, *H. J. Riddelsdell* (var. *hibernica*)! 41. *Glamorgan:* Port Talbot, Oxwich, and Swansea (*Hb. Riddelsdell*)! Penclaudd, Gower (*Hb. E. F. Linton*)! 45. *Pembroke:* Tenby, 1848, *C. C. Babington*, and 1867, *W. Trimen* (*Hb. Mus. Brit.*)! St. Davids (*Hb. Riddelsdell*)! 46. *Cardigan:* Glandyfi, *A. Ley* (*Hb. Mus. Brit.*)! Aberystwyth!! 48. *Merioneth:* Towyn (*Hb. Mus. Brit.*)! 49. *Carnarvon:* Bangor (*Hb. Riddelsdell*)! Carnarvon (*Hb. Mus. Dublin*)! Llanfairfechan!! 52. *Anglesea:* Holyhead!! Llanfair (*Hb. Mus. Brit.*)! 58. *Cheshire:* Sale and Claughton (*Hb. Boswell*)! Hoylake (*Hb. Whitwell*)! Malpar, Bulkeley Hill, &c. (*Hb. Wolley-Dod*)! Tabley (*Hb. Mus. Dublin*)! 59. *S. Lancs:* Kirkby (*Hb. Travis*)! Netherton (*Hb. Travis*, var. *hibernica*)! 60. *W. Lancs:* Little Eccleston (*Hb. Mus. Brit.*)! Preesall (*Hb. Painter*)! 68. *Cheviotland:* Holy Island (*Hb. Groves*)! 69. *Westmoreland and N. Lancs:* Furness Shores (*Hb. Mus. Brit.*)! 71. *Isle of Man* (*Hb. Hanbury*)! Port Erin (*Hb. Hiern*)! 72. *Dumfries:* Moffat (*Hb. A. Bennett*)! 74. *Wigton:* Stranraer and Portpatrick (*Hb. Mus. Brit.*)! Drumore (*Hb. A. Bennett*)! 77. *Lanark:* Near Glasgow (*Hb. Mus. Brit.*)! 80. *Roxburgh:* Melrose (*Hb. Druce*)! 85. *Fife:* Kirkcaldy, 1869 (*Hb. Boswell*)! 100. *Clyde Isles:* Arran (*Hb. A. Bennett*, with var. *hibernica*)! 102. *S. Ebudes:* Colonsay (*Hb. A. Bennett*)! 103. *Mid Ebudes:* Iona (*Hb. A. Bennett*)! 105. *W. Ross:* Ullapool (*Hb. Druce*)! 107. *E. Sutherland:* Golspie (*Hb. Druce*)! 110. *Outer Hebrides:* Vollay I., N. Uist, 1908, *W. A. Shoolbred* (*Hb. Mus. Brit.*)! 111. *Orkney:* Mainland, *E. S. Marshall*, no. 2415!

Subsection 3. Agrariæ.

Peduncles short or long. Pedicels generally erect-spreading and much thickened upwards. Bracts rarely much shorter than the fruiting pedicels and often finely acuminate. Sepals more or less toothed, rarely broader than the corolla or exceeding one-third of its entire length. Lower petal with spreading, more or less broad, margins, which extend along almost its whole length and are but little dilated towards the apex. Fruit usually larger than in the other subsections of the genus, coarsely rugose when dry and often strongly keeled.

The species of this subsection are generally well marked by the form of the lower petal and the large rugose fruits.

In *F. agraria* Lag., *F. major* Badarro, *F. atlantica* Coss. et Dur., and my *F. occidentalis* the largest and handsomest flowers of the whole genus, sometimes attaining a length of 15 mm., are to be found. A notable feature of the corolla in this subsection is the gradation that occurs in the development of the purple colouring of the tip of the petals. In *F. major* this dark colour marks the inner petals and the entire wings of the upper one; in *F. occidentalis* these wings are purple with white margins; in *F. agraria*, *F. atlantica*, and *F. amarysia* Boiss. et Held. the dark tips are confined to the inner petals; and, finally, in *F. macrocarpa* Parl. the purple colour disappears entirely.

F. amarysia, as represented by the specimen "Heldreich, Herb. Græc. Norm. 817. Attica, prope Hagios Sabbas, Apl. 1884," shows a resemblance to *F. Bastardi* Bor. of the previous subsection, and seems intermediate between that species and *F. judaica* Boiss.; while Heldreich's plant "*F. amarysia* Boiss. forma *scandens*, In olivetis prope Podoniphti, 1889," of which there are good examples both at Kew and at South Kensington, is apparently, judging from its small, pointed fruits, not a variety of that species at all, but rather a form of *F. Bastardi* and very near to Jordan's *F. vagans*.

F. macrocarpa is remarkable not only for its pale flowers but for the size of its fruits, which are the largest in the genus, being fully 3½ mm. in diameter and almost perfectly globular. This size is approached also by the fruits of *F. atlantica*.

[*F. agraria* Lagasca. This species was collected in 1903 by Mr. Druce at Iver, Bucks, where it is supposed to have been introduced with London street refuse. As it has presumably not established itself there, and has not occurred regularly to my knowledge in any other British station, it can hardly be given a place among the British Fumitories.]

6. Fumaria occidentalis Pugsley.

In the case of this species, which I discovered at Penzance in 1902 and described as a new plant two years later, there is but little to add to my paper in Journ. Bot. vol. xlii. pp. 217 *sqq*.

As was implied in that article by the comparison with *F. flabellata* Gasp., *F. occidentalis* shows some resemblance to the *Capreolatæ*, in which respect it is unique in its subsection. The likeness is seen in the relatively long peduncles, the frequently arcuate fruiting pedicels and the large sepals; but it is altogether outweighed by the form of the corolla and the fruit, which are both of markedly *agraria* type.

The figure accompanying my paper of 1904, which was drawn from one of my original Penzance specimens after pressing, depicts the fruit a little broader than in life, owing to an insufficient allowance having been made for shrinkage of the fleshy neck in the process of drying. The fruit is indeed similar in form to that of *F. agraria*, though the notched beak is, on the average, shorter; and both plants distinctly differ in this organ from *F. major* Bad., in which it is altogether more obovate and less keeled and beaked. Moreover, the rugosity of the fruit of *F. occidentalis* is less dense and uniform than in either of its allies; and a further peculiar feature that escaped my notice when first describing the plant is the development of a conspicuous tubercle at the base of each of its nearly obsolete apical pits, from which descends a more or less obvious longitudinal ridge.

It may be added that, besides the points of difference already mentioned for *F. occidentalis*, *F. atlantica* may be separated by its still larger fruits, and *F. rupestris* Boiss. (including *F. arundana*) by its lanceolate sepals, narrowly winged pink petals and smaller fruits.

As was to be expected, *F. occidentalis* has been found in a few additional Cornish localities since its publication as a species, but no earlier specimens under other names have come under my observation, except one, collected at Lelant by Mrs. E. S. Gregory in 1895. I think the Cornish botanists have not made any very serious attempts to discover it in the herbaria of their predecessors

The description, &c., of this plant is as follows, *viz.*:—

F. OCCIDENTALIS Pugsley in Journ. Bot. xlii. pp. 217 *sqq.* (1904).

Icon.—Journ. Bot. xlii. tab. 462.

Exsiccata.—S. H. Bickham, near Newquay, Oct. 1904, Hb. Mus. Brit.! J. Dörfler, Hb. Norm. 4814!

A plant of usually *very robust* habit and more or less branched, in fields suberect or decumbent, on walls and hedge-banks with long, trailing stems, sometimes climbing to a considerable height by its cirrhose petioles. Leaves irregularly 2–3 pinnatisect, light green, with leaflets cut into oblong-lanceolate, acute or mucronate lobes. *Racemes* 12–20-*flowered*, rather lax and lengthening in fruit, about *equalling the peduncles* but the lower sometimes shorter. *Bracts* lanceolate, acuminate, usually *nearly as long as the fruiting pedicels* but occasionally much shorter. *Fruiting pedicels much thickened* at the tip, *straight* and suberect in field forms *or arcuate* and slightly decurved in rampant plants. *Sepals* 4–5½ *mm. long and* 2–3 *mm. broad*, *ovate*, peltate, acute or shortly acuminate, frequently *incise-dentate towards the base*, white with greenish dorsal nerve, at least as broad as the corolla-tube. *Corolla large and handsome*, 12–14 *mm. long*, *rosy-white* in colour, with the *tip of the inner petals blackish red* and the *wings of the upper one similarly coloured externally*, *with* well-marked, broad *white margins* before fertilization. *Upper petal broad* and dorsally compressed, subacute, with broad, short wings reflexed upwards, exceeding the green keel and reaching the apex; spur relatively short. *Lower petal* often deflexed and free, *with* green keel, and *broad*, whitish, *spreading* or slightly deflexed *margins*, which extend from the base to the apex and are sometimes a little dilated above so as to form an almost subspathulate outline. *Fruits large*, fully 3 mm. long and about as broad; *sub-*

rotund; when fresh, subacute with an inconspicuous neck slightly narrower than the tip of the pedicel; when dry, distinctly *keeled-compressed* with the *keel drawn into a very short, blunt beak* which is *notched* at maturity, *coarsely* but not densely *tubercular-rugose*, with very shallow apical pits and below each of these a conspicuous tubercle, from which a longitudinal ridge, often very obscure but sometimes fairly marked on the side of the abortive ovule, descends to the base of the fruit.

Distribution.—This fine and well-marked species appears to be endemic in Great Britain, and is known only in Cornwall, where it grows in similar situations to the other fumitories, in whose company it may frequently be found.

Its recorded habitats, in addition to which it probably occurs in intermediate localities, are:—

1. *W. Cornwall:* Penzance!! Helston!! Newquay!! Lelant (*Hb. E. S. Gregory*)! St. Ives. Sithney. Perranporth. 2. *E. Cornwall:* Rock opposite Padstow, *H. E. Fox*, 1910! Little Petherick, St. Minver.

SECTION II. PARVIFLORÆ (ANGUSTISECTÆ of Haussknecht).

Leaf-segments flat or channelled, lanceolate or linear. Flowers rarely, if ever, larger than those of *F. officinalis* L., not exceeding 9 mm. in length. Upper petal (in good flowers) with broad margins or wings more or less spreading. Lower petal with margins or wings dilated towards the apex and spreading so as to form a spathulate outline. Inner petals nearly straight and relatively broader than in Section I.

Subsection 4. Officinales.

Peduncles usually short. Pedicels more or less thickened towards the tip, erect-spreading in fruit. Bracts usually shorter than the fruiting pedicels. Sepals more or less toothed, narrower than the corolla and rarely exceeding one-third of its length. Fruit very obtuse, truncate or subemarginate, obscurely keeled and at least as broad as long; with a very obscure fleshy neck when fresh, and rugose when dry.

In this group Haussknecht places *F. officinalis* L. with the two closely allied Eastern plants, *F. cilicica* and *F. Boissieri*, which he was the first to describe as separate species. The three plants are strongly characterized by their peculiarly broad and obtuse fruits, and show little affinity with either of the other groups, although some forms of *F. officinalis*, possibly of hybrid origin, tend to approach *F. Vaillantii* Lois. and *F. Schleicheri* Soy-Vill., while others have been confused with *F. muralis* Sond. and *F. micrantha* Lag.

7. FUMARIA OFFICINALIS L.

This well-marked species, which is described in *Species Plantarum*, ed. i. p. 700, and is represented by a specimen in the Linnean Herbarium, is one whose identity has been rarely mistaken. Considerable difficulty, however, has been found in the treatment of its varying forms, especially the rampant ones and those approaching *F. Vaillantii* Lois. and *F. Schleicheri* Soy-Vill., which have been referred to *F. Wirtgeni* Koch.

The diversity of form among these plants was noticed early in the last century by Reichenbach, in whose Icones Fl. Germ. a variety *scandens* is depicted, as well as a glaucous plant with *officinalis*-like fruit, which is figured and diagnosed as a distinct species, *F. media* Lois. In 1828 Fries (Novit. Fl. Suec. p. 221) made two varieties of this species—*β grandiflora* and *γ tenuiflora*; and in 1839 Walker-Arnott proposed three varietal names—*α grandiflora*, *β diffusa*, and *γ vulgaris*—in a paper read before the Botanical Society of Edinburgh. A year later Babington took up Reichenbach's variety *scandens* as a British plant, describing also as *F. Gasparinii* a Sicilian form that probably belongs to the same species.

In Parlatore's Monograph of the genus, p. 55 (1844), two varieties of *F. officinalis* are created:—

"*β densiflora*—Floribus magis dense racemosis et intensius purpurascentibus, foliorum laciniis angustioribus."

"*γ albiflora*—Floribus albis apice tantum purpureis."

In the succeeding year, in Koch's Synopsis Fl. Germ. ed. 2, p. 1017, a fresh set of varieties appears, *viz.*:—

"*α vulgaris*—major, diffusa, petioli sæpe cirrhiformes. *F. media* plurimorum botanicorum.

"*β minor*—herba intensius glauca, flores dimidio minores. *F. officinalis tenuiflora* Fries.

"*γ floribunda*—herba rigidior, firmior, intense glauca, racemi speciosi, flores saturatius purpurei; pulchra planta."

It is in this last work (p. 1018) also that *F. Wirtgeni* is described as a new species, from specimens collected at Coblenz, with a diagnosis:—"*Fructibus subrotundis obtusis* in apice ipso breviter apiculatis tuberculato-rugulosis, *sepalis ovato-lanceolatis acuminato-cuspidatis* dentatis corolla plus duplo brevioribus pedicello latioribus, *bracteis pedicello fructifero brevioribus*, *foliorum laciniis lanceolatis*. . . . Flores rosei. Dignoscitur habitu et floribus *F. officinalis* et siliculis *F. Vaillantii*. Petioli sæpe cirrhiformes."

Hammar in dealing with these plants adopts the varieties of Koch, with the addition of a var. *scandens*, of which he says "floribus suis parvis, albidis vel dilute roseis, fructibus magnis in racemis erectis, strictis, foliorum lobis latis, obtusis mucrone instructis, et toto suo habitu est præ cæteris insignis varietas . . ." Reichenbach's figure of the variety *scandens* is identified with var. *α vulgaris*, and that of *F. media* is quoted as illustrative of the new var. *scandens* Hammar. A new species, *F. tenuiflora* Fries Herb. 1826, is also introduced, based on a Leipzig plant named *F. acrocarpa* by Peterman. Of this, *F. Wirtgeni* Koch is quoted as a synonym.

The later monographer, Haussknecht, bestowed considerable attention on the living plants of this group, and after pointing out that in Germany *F. Wirtgeni* grows in company with *F. officinalis*, *F. Vaillantii*, and *F. Schleicheri*, he proceeded to show that Peterman's *F. acrocarpa* was really the last-named of these species, and Hammar's *F. tenuiflora* therefore not identical with *F. Wirtgeni* Koch, the descriptions of the floral and fruiting organs of these plants being confused owing to accidental admixtures of specimens. A sheet of *F. acrocarpa* Peterm. in Herb. Mus. Brit., though shade-grown, is still recognizable as *F. Schleicheri*.

F. Wirtgeni Koch is reduced by Haussknecht to a variety of *F. officinalis*, from the type of which it is said to differ "durch die kurzen Fruchttrauben, durch blässere, kleinere Blüthen, durch die rundliche deutlich ausgerandete Platte des obern, durch die rundliche vorn flach abgerundete oder etwas gestutzte Platte des untern Blumenblattes, dessen Ränder schmäler sind als die von *F. officinalis*; ferner durch die kleinern, kaum halb so langen Kelchblätter, so wie durch die vor dem Austrocknen flach abgerundeten Nüsschen mit kurzen Spitzchen." He distinguishes three forms of *F. officinalis* and of *F. Wirtgeni*; of the former, a. *floribunda* Peterm., b. *agrestis*, and c. *umbrosa*; of the latter, a. *vernalis*, b. *æstivalis*, and c. *umbrosa*: of which the first, in each case, is an early, erect-growing state, the second, a diffuse, branched plant, characteristic of summer cultivation, and the third, a rampant, shade-grown condition with small and pale flowers. As the distinctions on which these forms are founded seem to be of a vegetative nature, directly attributable to environment and not of any permanence, indeed, such as may readily be found with other species of *Fumaria*, e. g. in *F. Boræi*, the retention in this sense of "form" names—and I think Haussknecht attached to them but little importance—seems quite unnecessary.

In addition to his var. *Wirtgeni* and these forms of *F. officinalis*, Haussknecht admits three further varieties, viz.: β *minor*, near *Wirtgeni*, but separated by its emarginate fruits; δ *densiflora* Parl., with which Hammar's variety *floribunda* is identified; and ε *banatia*, a robust plant, with very broad leaf-segments and lax-flowered racemes, collected in Hungary and said to be represented by Reichenbach's figure of var. *scandens*. These varieties correspond approximately to Hammar's *minor*, *floribunda*, and *vulgaris*, and the *scandens* of the earlier author is apparently merged with Haussknecht's form *agrestis*, which is stated to include the *F. media* of many writers.

Among more recent works Willkomm & Lange's *Flora Hispanica* and Nicotra's Monograph take up Hammar's three varieties, *scandens*, *minor*, and *floribunda*, the latter following with *F. Wirtgeni* Koch as a separate species. Rouy & Foucaud's *Flore de France* shows an arrangement of the varieties somewhat similar but novel in its synonymy, *viz.* β *media* Coutinho (= *F. media* Lois. et Reichb. Icon.), γ *pycnantha* Loret & Barr (= *F. abyssinica* Hamm. Mon.), δ *minor* Koch, and ε *Wirtgeni* (= *F. Wirtgeni* Koch, *F. tenuiflora* Hamm. Mon., *F. officinalis* var. *scandens* Reichb.). All these varieties are ignored in Syme's *English Botany* and other recent British floras, although Reichenbach's *scandens* was adopted in the earlier editions of Babington's *Manual.*

It will now be seen that most authors are generally in agreement respecting the plants described by Haussknecht as the varieties *minor* and *densiflora*, but differ as to the rampant forms and *F. Wirtgeni.*

The first-named of these varieties (v. *minor*) is apparently not represented by an authentic specimen either at the British Museum or at Kew, nor can I find that it has been figured, but Haussknecht's description of it is in considerable detail and much more precise than that of Koch and Hammar, which may be intended for the same form. As Haussknecht himself does not identify his variety *minor* with that of his predecessors, and shows it to have a wide European distribution, I propose to take up his varietal name for certain plants occurring in the South of England which resemble it, passing over the same name of Koch and Hammar as of vaguer and less certain application.

The next variety, *densiflora* Parl. (=v. *floribunda* Hamm. ap. Haussk.), is a glaucous plant with finely cut foliage and short dense racemes, of which there is good and unmistakable material both at the British Museum and at Kew. It is a form characteristic of the South of Europe, of which I have seen no British specimen, and I doubt whether it is to be found in these islands. The record for it in Townsend's *Flora of Hants* probably refers to Haussknecht's early-flowering state, *floribunda*, with which the monographer remarks it was confused even by Koch.

The rampant forms of this species are not easily classified owing to the difficulty of determining which are only "states" and which are permanent varieties and forms. As already shown, two varieties of this nature were described by Hammar, who quotes a Reichenbach figure for each of them. The first, α *vulgaris*, is represented by Reichenbach's variety *scandens*, which Haussknecht refers to his var. *banatia*, a rare Hungarian plant. The British Museum possesses no example of var. *banatia*, but a very vigorous Tyrolean plant there (Haussman, circa Botzen, 1830) seems identical with it, and Peterman's Leipzig example of var. *scandens* Reichb. and other exsiccata labelled f. *agrestis* Haussk. and var. *vulgaris* Koch, though less luxuriant, are not readily separable. These latter plants are indistinguishable to my eyes from some forms occurring in Britain, but seeing that their divergence from the normal form, albeit at first sight they appear distinct, consists almost entirely in their more robust habit and broader leaf-segments, it seems doubtful whether they constitute a true variety so much as a form or perhaps a luxuriant state I therefore hesitate to adopt for them a varietal name and propose to treat them as a form *scandens* of the type, quoting as synonymous Reichenbach's figure of his var. *scandens.*

Hammar's second variety, β *scandens*, of which no authentic example has come before me, is more fully described than α *vulgaris*, and is said to be represented by Reichenbach's figure of *F. media* Lois., which is referred to the form *agrestis* by Haussknecht. The plant intended is of rampant habit, with broad leaf-segments, small pale flowers, and erect racemes of large fruits, and although Hammar thought it the most distinct of his varieties, it seems to differ from his α *vulgaris* mainly in its smaller flowers, and Haussknecht may have been wise in ignoring it. It may be held, at any rate, that Hammar's description points to a shade-form, and we certainly have in Britain very similar plants whose features are due solely to immediate environment.

There is, however, a further rampant form, apparently found in this country chiefly in chalk districts, whose characters are more fixed. This is likewise notable for its relatively small and pale flowers, which are usually borne in very long racemes, but its fruits differ from those of Hammar's plant in being smaller, on an average, than in the type, and carried on slenderer pedicels; and the foliage is almost invariably glaucous, ample and somewhat finely cut. The rampant habit seems constant in spring as well as summer, and normally it is a distinct and graceful plant though, if shade-grown, not easily to be distinguished from other forms of the species similarly nurtured. In recent years more than one British botanist has suggested that it deserves a name, and as it cannot be satisfactorily identified with either of the forms or varieties already referred to, I am distinguishing it as var. *elegans*. It is fairly well represented by Reichenbach's figure of *F. media* Lois., which I believe to be drawn from an ill-grown example of it; and it is the form of *F. officinalis* that has been most commonly confused by British botanists with the *Murales*.

Of *F. Wirtgeni*, which, as already stated, was reduced by Haussknecht to a variety of *F. officinalis*, there is satisfactory material at the British Museum and at Kew, including specimens collected by Wirtgen and by Haussknecht. Wirtgen's specimens, which are in only moderate condition, show little resemblance to *F. Vaillantii*, having lax racemes bearing on long slender pedicels as many as thirty-six flowers (Billot, Fl. G. et G. no. 1603). Such fruits as remain are retuse as in ordinary *F. officinalis*, and the specimens appear to me inseparable from the variety *elegans*. Haussknecht's specimen, on the other hand, is a different form, with few-flowered racemes, shorter pedicels, smaller sepals, and more rounded fruits, and it agrees fairly well with the tabular diagnosis in his Monograph. In a limited degree it shows an approach towards *F. Vaillantii*, and may have originated in a cross between this species and *F. officinalis*, but as it seems a perfectly fertile and widely established form, I think, with Haussknecht, it is best regarded as a variety of the latter. Quite recently I have seen in Mr. Lacaita's herbarium a specimen from Wirtgen differing from those in Herb. Mus. Brit. and identical with Haussknecht's plant, and another similar plant from Wirtgen in Mr. C. Bailey's collection is labelled *F. Vaillantii* Lois.—from which it is evident that some mixture of Wirtgen's specimens or labels must at some time have taken place.

In Britain a plant identical, I believe, with Haussknecht's var. *Wirtgeni* occurs in chalk districts and elsewhere in the southern counties. A specimen of this, collected at Darenth, was identified as *F. Wirtgeni* by Mr. E. G. Baker as long ago as 1899. Some British examples that I have seen almost exactly match in every respect Haussknecht's plant in Herb. Mus. Brit., but others show longer sepals, and, as tends to happen in Britain with the genus generally, larger fruits. As the localities where these British *Wirtgeni*-forms grow have produced, at least in some cases, both *F. officinalis* and *F. Vaillantii*, it is not unlikely that here, as in Germany, we may have plants of really hybrid origin.

F. officinalis is subject to one other somewhat notable variation which seems to have escaped the notice of Hammar and is said by Haussknecht to characterize the variety *Wirtgeni*. This may be seen in the shape of the dried fruit, which, though typically slightly emarginate in profile, is occasionally, in forms showing no other deviation from the type, simply truncate with a persistent but very short apiculus. I have noticed this feature in a few British examples not referable to var. *Wirtgeni* and in Peterman's Leipzig specimen of var. *scandens*, but I cannot correlate it with any other peculiarities or refer it especially to any particular forms of the species other than var. *Wirtgeni*, where it normally appears, and so, though remarkable, I doubt whether it is of much importance. The dissection accompanying Reichenbach's Icon. 4454 of *F. officinalis* shows this apiculate fruit, and is probably drawn from life, when a slight apiculus is frequently visible. It is also seen in *English Botany*, tab. 589, and is mentioned in Syme's account of the living plant.

As noticed in the early part of this paper, *F. officinalis* is one factor in all the hybrid Fumitories that have come under my observation. The origin of the anomalous *F. Painteri* has already been alluded to, as well as the possible parentage of the variety *Wirtgeni*, and besides these more or less established forms, isolated plants, clearly direct hybrids bearing little if any fruit, may occasionally be found where two or more species grow in company. Mr. Andrews sent me from Guernsey in 1900 some crosses, *F. Boræi* × *officinalis*, in which the flowers were only 9 mm. long and of intermediate form, and the fruits entirely abortive. In the autumn of 1910 I found at Mickleham, Surrey, with the parents, one hybrid individual, presumably *F. officinalis* × *parviflora*. This was an enormous plant, with some hundreds of racemes, but I could not discover a single developed fruit. The foliage was *officinalis*-like in form, but very small throughout; and the flowers, which were 6 mm. long, coloured as in pale *F. officinalis* and with sepals not exceeding 1½ mm., were extraordinary in that the outer petals showed scarcely any spathulate dilation of the wings. I also possess what I believe to be direct hybrids, *F. officinalis* × *Vaillantii*, which differ from the foregoing in that a proportion of the capsules are fully developed. Of *F. officinalis* × *micrantha*, which is inserted in Mr. Druce's list as *F. Salmoni*, I have seen no unquestionable specimen, but as the two species frequently grow together, it is quite likely that hybrid individuals may occasionally occur.

The synonymy, description and distribution of *F. officinalis* are as follows:—

F. OFFICINALIS L. Spec. Plant. ed. 1, p. 700 (1753); Fries, Nov. Fl. Suec. p. 221 (1828); Handschuch, De Plant. Fum. p. 33 (1832); Parlat. Mon. Fum. p. 53 (1844); Koch, Syn. Fl. Germ. ed. 2, p. 1017 (1845); Gren. & Godr. Fl. Fr. i. p. 68 (1847); Hamm. Mon. p. 9 (1857); Syme, Eng. Bot. ed. 3, i. p. 110 (1863); Haussknecht in Flora, p. 404 (1873); Rouy & Foucaud, Fl. Fr. i. p. 177 (1893); Nicotra, Le Fumar. Ital. p. 61 (1897).

Icones.—Eng. Bot. 589; Reichb. Icon. Fl. Germ. 4454; Hamm. Mon. tab. i. fig. 1; Clavaud, Fl. Gironde, Pl. 4, fig. 1.

Exsiccata.—Kerner, Fl. Exsicc. Austro-Hungarica, No. 2901! J. H. Morgan, Chepstow, 1892, Hb. Mus. Brit.!

A *plant* of *more or less robust* habit and often much branched; in open fields *either suberect* and compact, *or*, generally later in the year, more or less *diffuse*; in bushy places and in shade often rampant and climbing by its cirrhose petioles. Leaves 2–3 pinnatisect, usually somewhat glaucous, with *leaflets* cut, sometime more or less divaricately, into *flat*, *lanceolate or linear-oblong*, acute or slightly mucronate *lobes*. *Racemes dense* at first, but afterwards lengthening, *many-flowered* (flowers normally more than 20, sometimes many more), *exceeding the peduncles*. *Bracts* linear-lanceolate, acuminate, generally *a little shorter than the fruiting pedicels*, but occasionally only half as long. *Fruiting pedicels* of moderate thickness, *straight and erect-spreading*. *Sepals* 2–3½ *mm. long and* 1–1½ *mm. broad*, *ovate or ovate-lanceolate*, scarcely peltate, irregularly *dentate or laciniate* towards the base, *acuminate or cuspidate*, pinkish or less often white in colour, with a fine purple or greenish median nerve, narrower than the corolla-tube. *Corolla* 7–8 (rarely 9) *mm. long*, *purplish-pink in colour*, with the tip of the inner petals and the *wings* of the upper one *blackish-red*. *Upper petal broad and dorsally compressed*, *obtuse* or rarely apiculate, with a spathulate dilation of the erect-spreading wings exceeding the keel and usually extending to its apex. *Lower petal with spreading margins* narrow below but more or less abruptly dilated towards the apex in a *spathulate* outline. *Fruits of moderate size*, about 2 mm. long and 2½–3 mm. broad, *truncate or retuse* and almost *obreniform* in profile (broadest above the middle) with, occasionally, a small apiculus, little compressed laterally and obscurely keeled, and narrowed below to an almost obsolete neck nearly equalling the tip of the pedicel; when dry, *rugose* with rather broad and shallow apical pits.

Forma *scandens*.

Icon.—Reichb. Icon. Fl. Germ. 4454, v. *scandens*.

Exsiccata.—Peterman, Leipzig, Hb. Mus. Brit.! Haussman, circa Botzen, 1830, Hb. Mus. Brit.! De Heldreich, Herb. Græc. Norm. 1204! R. et W. Fl. Polon. Exsicc. 4 (as *F. officinalis*, v. *vulgaris* Koch)!

Herba virens sæpe petiolis cirrhosis scandens; habitu robustiore, caulibus crassis et foliis amplis in lobos majores lineari-oblongos fissis a typo differt.

Differs from rampant states of the type in its more robust habit, with thick stems and ample, less glaucous foliage cut into larger, linear-oblong segments.

β ELEGANS, nov. var.

Icon.—Reichb. Icon. Fl. Germ. 4453 (as *F. media* Lois.).

Exsiccata.—Billot, Fl. G. et G. no. 214! et no. 1603 (as *F. Wirtgeni* Koch)! E. S. Marshall, Kemsing & Otford, 1891, Hb. Mus. Brit. (as *F. muralis*)!

Elata vel petiolis cirrhosis scandens; *folia glauca*, foliolis in lobos tenues lanceolatos fissis ampla. *Racemi multiflori* (sæpe 30–40-flori), *pedicellis tenuibus bracteas subduplo excedentibus* interdum floriferis recurvatis. Corolla pallide purpurea, sæpissime circa 7 mm. longa, petalis exterioribus quam in typo angustius alatis; sepala sæpe albida. *Fructus* vix 2 mm. longi et 2½ mm. lati *quam in typo minores*, minus compressi et obscurius rugosi.

More constantly *rampant* in habit than the type, with ample, *glaucous foliage*, with leaflets cut into rather fine, lanceolate segments. *Racemes very many-* (often 30–40-) *flowered*, with *slender pedicels*, which are sometimes recurved in flower. *Bracts normally about half as long as the fruiting pedicels.* Flowers generally pale purplish-pink, usually about 7 mm. long, with the upper and lower petals somewhat narrowly winged; sepals often whitish. *Fruits smaller* than in the type, barely 2 mm. long and 2½ mm. broad, less laterally compressed and more finely rugose.

γ MINOR Haussknecht in Flora, p. 409 (1873).

Exsiccata.—E. S. Marshall, no. 2551!

Diffuse in habit and often much branched, with glaucous foliage. *Racemes rather lax*, 10–20-*flowered*. *Sepals about* 2 *mm. long*, with variable toothing. Corolla rather smaller and paler than in the type, in form approaching that of var. *Wirtgeni*. *Fruits* 2 mm. long and 2½–3 mm. broad, retuse and *similar to those of the type.*

δ WIRTGENI Haussknecht in Flora, p. 404 (1873).

F. Wirtgeni Koch, Syn. Fl. Germ. ed. 2, p. 1018 (1845).

Exsiccata. — Dörfler, Herb. Norm. 4601 (as *F. Wirtgeni*)! W. H. Painter, Knowle, Somerset, 1881, Hb. Mus. Brit. (as *F. officinalis*)! W. Fawcett, St. Helier's, Jersey, Hb. Mus. Brit. (as *F. officinalis*)! G. L. Bruce, Darenth, 1899, Hb. Mus. Brit.!

Variable in habit and foliage like the type, but, on an average, slenderer, and in summer, sometimes very much branched. *Racemes rather lax*, usually only 10–20-*flowered*, with pedicels shorter and thicker than in the type. *Sepals about* 2 *mm. long and* 1 *mm. broad*, generally less acuminate than in the type and whitish in colour. *Corolla* rather smaller and paler than in the type, with the *wings* of the outer petals *much produced at the apex*, rendering the outline of the upper petal emarginate and that of the lower one truncate-spathulate. *Fruits* 2–2½ mm. long and very slightly, if at all, broader, *rounded-truncate but not retuse*, and usually showing a small, persistent apiculus, *broadest about the middle*, and narrowed below to a neck less obscure than in the type; when dry, with well-marked rugosity and very shallow apical pits.

Distribution.—F. officinalis occurs, according to Haussknecht, throughout the European continent, except the extreme north, and extends through Asia Minor to Persia and Arabia, as well as to Siberia across the Urals. It is also found along the north coast of Africa and in the Canaries, and has been introduced on the American continent, though seemingly less extensively so than *F. capreolata* and *F. agraria*. In Europe it appears to be the most generally distributed and most abundant species of the genus, but its range does not extend so far eastward into Asia as with some of the *Microsepalæ*, and it does not naturally reach the southern hemisphere like *F. muralis*.

It is interesting to note that a specimen in the British Museum from Herb. Pallas is labelled "In rupestribus Tauriæ ubique," as it may be inferred from this that in the Crimea it flourishes in natural habitats, and hence that district may possibly be its original home.

The species is known to occur in the following countries:—

Sweden. Finland (*Hb. Kew*)! West Russia! Poland! Germany! Tyrol! Switzerland!! France! Spain! Portugal! Corsica! Sardinia (*Hb. Kew*)! Italy! Sicily! Austria! Hungary! Istria! Dalmatia! Herzegovina (*Hb. Kew*)! Greece! Crimea!

Anatolia! Pisidia! Syria! Persia (*Haussk.*).

Algeria (*Hb. Kew*)! Morocco (*Hb. Kew*)! Canaries.

Canada (*Hb. Kew*)! New Granada! Argentina (*Hb. Kew*)!

Of the variety *elegans* I have seen French and German specimens; of var. *Wirtgeni*, examples from Germany only, but it is recorded by Haussknecht also for France, Switzerland, Tyrol, Dalmatia and Bohemia. The variety *minor* is recorded for Germany, France, Spain, Sicily, Austria and Dalmatia.

F. officinalis is found, as may be expected, in the Channel Islands, where the var. *Wirtgeni* has also been collected, and the species is shown by Mr. Praeger's list to be widely though not universally distributed in the Irish counties from Cork to Antrim.

In Great Britain it is the commonest and most widely spread member of the genus, and has been recorded in *Topographical Botany* and its Supplement for every vice-county except 48 (Merioneth), 98 (Argyll) and 104 (North Ebudes), in which districts it has very possibly been overlooked. It seems to affect almost every kind of cultivated ground, provided the soil is fairly light, but, like *F. Bastardi*, is rarely seen on walls or hedge-banks.

The three varieties *elegans*, *Wirtgeni*, and *minor* are of much less frequent occurrence and seem to be chiefly found in the South of England, and especially in the chalk districts of Kent and Surrey, where I have gathered the two first-named growing in company but keeping perfectly distinct.

Subsection 5. Latisepalæ.

Peduncles short. Pedicels more or less thickened towards the tip, erect-spreading or recurved in fruit. Bracts sometimes exceeding and never much shorter than the fruiting pedicels. Sepals large, often but little toothed, at least as broad as the corolla and rarely less than one-third of its whole length. Fruit obtuse or subacute, usually obscurely keeled and never broader than long; with an obscure fleshy neck, when fresh, and when dry, varying from smooth to granular-rugose.

The five species placed in this subsection by Haussknecht, *viz.*, *F. micrantha* Lag., *F. rostellata* Knaf, *F. Thureti* Boiss., *F. anatolica* Boiss. and *F. Pickermiana* Boiss., form a somewhat anomalous group, referable to the section *Parvifloræ* on account of their finely cut foliage, but showing more or less floral affinities with some of the *Grandifloræ*. Except in *F. Thureti* the flowers are quite small, but the relatively large bracts and sepals recall the subsection *Capreolatæ*, and in none of the five species is the spathulate dilation of the lower petal so well marked as in the other *Parvifloræ*. In the case of *F. Thureti*, which in Hammar's Monograph stands among the *Capreolatæ*, I can find no such dilation whatever, and considering also its larger flowers, I am disposed to think that it might be more correctly placed with *F. Reuteri* and *F. Munbyi*, which it approaches in fruit, among the *Mediæ*, or possibly still better with the *Capreolatæ*. *F. anatolica* also, though much more nearly allied to *F. rostellata* and clearly a member of the *Latisepalæ*, bears a curious resemblance to a miniature *F. purpurea*.

8. FUMARIA MICRANTHA Lagasca.

This plant, which in its normal form is one of the most distinct species of the genus, is unique in its combination of finely cut foliage and small flowers with remarkably large and broad sepals and bracts. It was first clearly distinguished by the Spanish botanist Lagasca, who, in Elenchus Plant. in Hort. Matrit. p. 21 (1816), diagnosed it as follows, *viz.*: "Calycibus cordato-rotundatis corollæ tubo latioribus; foliis pinnato-decompositis linearibus angustissimis. Flores dense spicati, erecti." And it duly figures as one of the ten known species in Parlatore's Monograph, where it is well described, and appears again in the second edition of Koch's *Synopsis*.

Prior to the publication of these last two works it was described by Babington in Trans. Bot. Soc. Edin. i. p. 34, as a new species, which he named *F. calycina* from its remarkable calyx. The description was drawn up from Edinburgh specimens that had already been referred to *F. micrantha* by Arnott in Report Bot. Soc. Edin. p. 104 (1840), an identification with which Babington did not agree till a later date.

In Grenier & Godron's Fl. de France *F. micrantha* Lag. was reduced to a synonym of *F. densiflora* DC., which had been published in 1813; and in recent works a difference of opinion has prevailed as to which of these two names should be preferred.

F. densiflora was first described by De Candolle in Cat. Plant. Hort. Bot. Monspel. p. 113, from examples found by Ziz near Toulon, in the following terms:—"F. capsulis globosis, racemis oppositifoliis densis, caule erecto, foliis multifidis, lobis linearibus crassiusculis . . . omnino est *F. spicata* quoad habitum et florescentiam sed capsulis globosis nec compressissimis distincta."

In the *Systema Naturale*, ii. p. 137, it was again similarly described, but with certain additions. These additions are ". . . pedicellis fructiferis erectis bracteâ longioribus . . . calycibus dentatis . . . corollæ minores quam in *F. mediâ*, intense purpureæ . . . Sepala *F. mediæ*, cætera *F. officinalis*, cujus forsan mera varietas." Further on in this work, as a "species non satis nota," appears *F. micrantha* Lag., with the following diagnosis: "In Hispaniâ. Folia pinnato-decomposita, linearia, angustissima. Calyces cordato-rotundati corollæ tubo latiores."

This account, both of *F. densiflora* and of *F. micrantha*, is virtually repeated in De Candolle's *Prodromus*.

It will be seen that there is no allusion in De Candolle's original description to the large sepals peculiar to *F. micrantha*, and that, although the fruit is described as globose, this term may be intended in a wide sense in contrast to the flattened fruits of *F. spicata*.

In the *Systema Naturale* the bracts are stated to be shorter than the fruiting pedicels, while in *F. micrantha* they are normally longer; and the sepals are likened to those of *F. media*, which cannot, in whatever sense that name be interpreted, be said to resemble those of Lagasca's plant. Moreover, De Candolle himself suggests that his *F. densiflora* may be a variety of *F. officinalis*, and does not anywhere recognize its connection with *F. micrantha*.

According to the testimony of Boissier (*Voyage dans l'Espagne*, ii. p. 796) and others, the plant collected by Ziz on which *F. densiflora* was originally founded is an abnormal form of *F. micrantha*, not rare in Southern Europe, while the remaining material under the same name in the Candollean Herbarium is referable to *F. officinalis*.

On this ground, that the plant of Ziz—the first to be described by De Candolle—was actually identical with *F. micrantha*, Grenier and Godron, and later Haussknecht, set aside Lagasca's name in favour of *F. densiflora*. It is evident, however, that this identity was never recognized by De Candolle; and as his first account of *F. densiflora* in Cat. Monspel. seems equally applicable to forms of *F. officinalis*, while his later ones clearly indicate that species and none makes any mention of the typical features of *F. micrantha*, I think it is impossible to do otherwise than to regard his name as an ambiguous and invalid one, covering the plants represented in his herbarium, *viz.*, an untypical form of *F. micrantha* and a dense-flowered variety of *F. officinalis*. This conclusion is in accord with the arrangement in Parlatore's Monograph, and has been followed by Hammar, Syme, Boissier, Rouy & Foucaud and Nicotra, all of whom adopt Lagasca's name for the species under discussion.

In view of the wideness of its distribution, extending, as it does, from Spain to Persia, *F. micrantha* seems to exhibit comparatively little range of variation. The first variety to be established was *β Parlatoriana* Boissier, published in *Flora Orientalis*, i. p. 137 (1867), and founded on the *F. Parlatoriana* of Kralik, which was discovered at Alexandria. Its diagnosis runs: "Laciniæ tenuiores setaceæ, sepala subangustiora. Flores parvi rosæi"; and it is maintained as a variety in Haussknecht's Monograph, where additional characters are given. The small flowers are there stated to exceed but slightly 3 mm. in length, with sepals little more than 1 mm. long and ½ mm. broad; and the pedicels are said to be shorter and thicker than in the type, and the fruits more clearly keeled. Oran, in Algeria, is quoted as a second habitat.

In Rouy & Foucaud's *Flore de France* this variety is inserted as an inhabitant of Marseilles and Perpignan, but the only essential varietal character mentioned is the smallness of the sepals, and it may be doubted whether the plant intended is identical with the African form.

There is good Egyptian material of this variety at Kew.

I possess specimens from Oran, sent under the name of *F. densiflora* DC. *β bracteosa* Batt. (*F. bracteosa* Pomel, Nouv. Mat. Fl. Atlant. 239), which are not readily separable from the variety *Parlatoriana*.

The only remaining variety of *F. micrantha* that I can trace is *β littoralis* Rouy & Foucaud, which was described as a distinct species, *F. littoralis*, by Du Mortier in Bull. Bot. Soc. Roy. Belg. vii. p. 359 (1868), from specimens found at Ostend and elsewhere on the Belgian coast. Of this plant Du Mortier says:—"Ses tiges . . . sont flasques, décombantes et très-rameuses; ses feuilles . . . sont glauques et à pinnules aplaties; son épi est comme caché dans les feuilles; ses sépales fortement dentés . . . ne dépassent pas la moitié du tube de la corolle (corollâ angustioribus); enfin ses fleurs blanchâtres sont en épi serré composé d'un petit nombre de fleurs . . ." No authentic examples of this plant have come under my notice, but judging from its reputed characters it seems at most only varietally distinct from ordinary *F. micrantha*. Indeed, the lax habit and pale flowers in poor racemes may be simply due to growth in very light soil, and the flattened leaf-segments, which I have noticed in seaside Scotch examples of *F. micrantha*, can well be attributed to maritime influence, and regarded as analogous with the thick leaves often found on such plants as *Lotus corniculatus* in similar situations.

As this variety is recorded not only from Belgium but from Dunkirk and other places on the adjacent French coast it may be expected to occur in the south-east districts of Great Britain.

Among the British material of *F. micrantha* that I have examined no specimen of either of the above-mentioned varieties has come to light, and I have noticed but little essential variation. In shade-grown or starved plants the leaf-segments tend to become laxer and broader, the pedicels thinner and longer, and the sepals narrower, while near the sea a flattened type of leaf-cutting sometimes prevails.

There is, however, a well-grown plant in Herb. Mus. Brit., collected by Ridley and Fawcett at Wareham, which seems more permanently distinct. This specimen is much branched, with good flowers slightly smaller than those of the type, and relatively narrow, ovate sepals, laciniate-toothed below, and only 2–2½ mm. in length. In this case the narrow sepals seem normal and are somewhat similar to those shown in the French examples "Billot, Fl. Gall. et Ger. no. 709" and "*F. micrantha*, Société Dauphinoise, 1879, no. 1950" at Kew. In each of these specimens the sepals are ovate rather than orbicular and approximately twice as long as broad, and as this proportion (sepals 2–4 mm. long, 1–2 mm. broad) is given by Haussknecht as characteristic of the species, he probably examined other similar material, and such plants may be not uncommon in Continental herbaria. But it appears to me that plants with sepals of this kind, though perhaps not a good variety, are distinctly separable from the type of *F. micrantha*, in which, given good flowers, the sepals are nearly orbicular; and so I propose to distinguish the Wareham specimen as a form *dubia*. I suspect the plant of Ziz, originally described by De Candolle, may possibly be referred to this form, which in the absence of fruit may easily be confounded with some states of *F. officinalis*, and especially with its variety *densiflora* Parl. French specimens of *F. officinalis* with unusually large sepals have been sent me under the name of *F. micrantha* Lag. var. *Parlatoriana* Boiss.

The description, &c., of these plants, as known in Britain, is as follows:—

F. MICRANTHA Lagasca, Elench. Hort. Matr. p. 21 (1816); Parlat. Mon. Fum. p. 60 (1844); Koch, Syn. Fl. Germ. ed. 2, p. 1018 (1845); Hamm. Mon. p. 21 (1857); Syme, Eng. Bot. ed. 3, i. p. 109 (1863); Rouy & Foucaud, Fl. de Fr. i. p. 179 (1893); Nicotra, Le Fumar. Ital. p. 72 (1897).

F. densiflora DC. Cat. Hort. Monspel. p. 113 (1813); Syst. Natur. ii. p. 137 (1821); Prodr. Syst. Nat. i. p. 130 (1824), ex parte; Gren. & Godr. Fl. de Fr. i. p. 68 (1847); Haussknecht in Flora, p. 507 (1873).

F. calycina Bab. in Trans. Bot. Soc. Edin. i. p. 34 (1840).

Icones.—Eng. Bot. Suppl. 2876; Hamm. Mon. tab. ii. fig. 2.

Exsiccata.—De Heldreich, Herb. Græc. Norm. 1205! F. Schultz, Herb. Norm. Cent. 17, 211 *bis*! E. S. Marshall, Wishford, S. Wilts, 1904, Herb. Mus. Brit.!

A plant of *more or less robust* habit, usually moderately branched and with rather long internodes; in open fields *generally suberect*, but sometimes diffuse; rarely rampant with cirrhose petioles. Leaves irregularly 2–4 pinnatisect, slightly glaucous, with *leaflets* cut into *channelled* (or, in maritime states, flat and thickened), *linear or linear-oblong*, acute or mucronate *lobes*. *Racemes very dense at first*, but soon lengthening and *becoming lax in fruit, many-* (normally 20–25-) *flowered, much exceeding* the stout, very short or sometimes even obsolete *peduncles*. *Bracts* linear-oblong, cuspidate, normally *exceeding the fruiting pedicels*, whitish in colour but suffused with pink above, and with green midrib. *Fruiting pedicels* short unless shade-grown, considerably dilated above, usually *straight and erect-spreading*. *Sepals* 2½–3½ *mm. long and* 2–3 *mm. broad*, nearly *orbicular or* in late flowers *broadly ovate*, peltate or subcordate, often *subentire but sometimes laciniate* towards the base, *mucronate or acute*, white with more or less pink tinting and an obscure median nerve, much broader than the corolla-tube. *Corolla* 6–7 *mm. long, rosy-pink in colour*, with the tip of the inner petals and the *wings* of the upper one *blackish red*. *Upper petal rather narrow* and somewhat *laterally compressed, obtuse* or subacute, with a subspathulate dilation of the erect-spreading wings, which rarely much exceed the keel, though usually extending to its apex; spur ascending, relatively large and rounded. *Lower petal with spreading margins*, narrow below but dilated towards the apex in a *subspathulate* outline. *Fruits of moderate size*, 2–2½ mm. long and equally broad, *subglobose*, broadest about the middle with very little lateral compression but a fairly marked keel, *rounded-obtuse* above (with a minute apiculus, when fresh) and reduced below to an indistinct neck a little narrower than the tip of the pedicel; when dry, *rugose* with obscure and shallow apical pits.

Forma *dubia*.

Exsiccata.—Ridley & Fawcett, Wareham, Dorset, 1883, Herb. Mus. Brit.!

Typi habitum, folia, bracteas fructusque habet, sed flores paulo minores sepalis semper ovatis, acutis, 2–2½ mm. longis, 1–1½ mm. latis, infra plus minusve laciniatis præditos.

This form resembles the type in habit, foliage, bracts and fruit, but the flowers are somewhat smaller, not exceeding 6 mm. in length, with the sepals normally ovate, acute, only 2–2½ mm. long and 1–1½ mm. broad, and more or less laciniate towards the base.

From the variety *Parlatoriana* it may be distinguished by its ampler foliage, longer pedicels, larger flowers and less keeled fruits; and from var. *littoralis* by its channelled leaf-segments and longer racemes of pinker flowers.

Distribution.—Like *F. Bastardi*, this is chiefly a Mediterranean species. It occurs in the following countries :—

Germany (*Hb. Kew*)! Holland (*Nyman*). Belgium! France! Spain (*Hb. Kew*)! Corsica (*Nicotra*). Sardinia (*Hb. Kew*)! Italy (*Haussk.*). Sicily (*Haussk.*). Macedonia (*Hb. Kew*)! Rumelia (*Nyman*). Greece!

Asia Minor! Cyprus (*Hb. Kew*)! Syria! Mesopotamia (*Hb. Kew*)! Persia (*Haussk.*). Caucasus (*Haussk.*).

Egypt (with var. *Parlatoriana*—*Hb. Kew*)! Cyrenaica (*Hb. C. Bailey*)! Tunis! Algeria!

F. micrantha does not appear to have been recorded for the Channel Islands, and it is rare in Ireland, being known only for five vice-counties.

In Great Britain it is almost exclusively a plant of cornfields and other arable ground, and is recorded in *Topographical Botany* and its Supplement for forty-two vice-counties, ranging from Dorset and Kent to Orkney. From twenty-three of these vice-counties I have myself seen specimens and I know of no sufficient reason for doubting the correctness of any of the remainder. In addition, specimens from 73, Kirkcudbright (Creetown, G. C. Druce, as *F. Boræi*, in Herb. Mus. Brit.) and from 92, S. Aberdeen (Braemar, Croall, in Herb. Kew) have come under my notice, thus making the vice-comital total forty-four.

It is noteworthy that this fumitory is characteristic both of the chalk districts of the South of England, where it often accompanies *F. Vaillantii* and *F. parviflora*, and of the old Red Sandstone regions on the Welsh border and especially on the eastern side of Scotland, in which districts it is associated with the large-flowered species.

The form *dubia* I have only seen hitherto from one British locality—Wareham, in Dorset.

Subsection 6. Microsepalæ or *Parvifloræ* of Haussknecht.

Peduncles short. Pedicels more or less thickened or slender, erect-spreading in fruit. Bracts variable. Flowers very small, with sepals relatively small or minute (obsolete in *F. asepala* Boiss.), usually much toothed, always narrower than the corolla, and less than one-fourth of its whole length. Fruit obtuse or acute, never broader than long; with an obscure fleshy neck when fresh, and when dry, more or less rugose.

The species placed in this subsection by Haussknecht, who was well acquainted with the plants of this group in a living state, are *F. asepala* Boiss., *F. parviflora* Lam., *F. Vaillantii* Lois., *F. Schleicheri* Soy-Vill., *F. Jankæ* Haussk. and *F. abyssinica* Hamm. Taken together, they form a well-marked series, characterized especially by their small flowers and very small sepals, and in a less degree, by their uniformly straight and erect-spreading fruiting pedicels and rugose fruits. The only species likely to be confounded with members of the other subsections are *F. Jankæ*, which is somewhat intermediate between *F. Schleicheri* and *F. rostellata*, of the subsection *Latisepalæ*, and *F. abyssinica*, which in foliage and flowers shows a resemblance to *F. officinalis* var. *densiflora*, but has fruits not unlike those of *F. parviflora*.

It is noteworthy that the headquarters of this subsection lie distinctly more to the east than those of any other division of the genus. The species seem to occur abundantly in Western Asia—to which region *F. asepala* is apparently confined—and extend to Manchuria, Turkestan, and India. *F. abyssinica* is entirely an East African plant, its habitats ranging from Abyssinia to Kilimandjaro.

9. Fumaria parviflora Lamarck.

The name of *F. parviflora* was first published in Lamarck's *Encyclopédie Méthodique*, ii. p. 567 (1788), to represent a fumitory, grown in the Jardin du Roi at Paris, which the author believed to have originated in the South of France. The description emphasizes the features, "F. siliculis globosis . . . foliis tenuissime divisis . . . floribus albis," and quotes Vaillant, Paris, tab. 10, fig. 5, in illustration, the writer adding, "Ses fleurs sont beaucoup plus petites que celles de *F. officinalis* . . . ses tiges sont . . . glauques . . . diffuses . . . s'accrochant à toutes les plantes qui sont près d'elles, autour desquelles elles entortillent les pétioles de leurs feuilles . . . Les fleurs sont d'un blanc, mêlé d'un peu de vert et tâché d'un pourpre foncé . . . à leur mufle . . . sur des épis fort petits . . . lâches . . ."

The determination of the plant intended was rendered easy by this clear description, and eleven years later it was identified as British in *English Botany*, 590, where the figure and description are taken from a specimen (collected in 1792 by Jacob Rayer in cornfields near Rochester) which is in the British Museum Herb. The fruit of this specimen of Rayer's, however, is not globose, as in Lamarck's description, but somewhat pointed and ogivale in profile, and this is depicted in Sowerby's plate as markedly acuminate.

In 1824 *F. parviflora* was redescribed in Viviani's Fl. Corsicæ Spec. Nov. Diagn, p. 12, as *F. leucantha*, the author stating that his plant was the same as that of Lamarck, with "flores constanter albi," but not that of Smith's Eng. Bot. 590, from which it differed "siliqua neque acumine aucta, neque emarginata."

Lamarck's species was subsequently recognized by Handschuch, who considered the fruit "acutiuscule," and by Parlatore, who thought it acuminate, and, rather strangely, smooth. In Reichenbach's *Icones* it is drawn with subglobose but distinctly pointed fruits and abnormally large sepals. It also appears, with similar features, in Koch's *Synopsis*, ed. 2, and in Grenier & Godron's Fl. de France, *F. leucantha* being mentioned in the latter work as differing by its lack of apiculus to the fruit.

Another plant allied to *F. parviflora* was published in 1852 by Jordan (*Pugillus*, p. 8) as a new species, *F. glauca*, which, after a detailed diagnosis, is distinguished thus :—"A simillimâ *F. parviflora* Lam. (*leucantha* Viv.) foliis glaucis circumscriptione latioribus, lobis eorum duplo brevioribus et crassioribus canaliculatis aliisque notis differt."

In Hammar's Monograph both *F. leucantha* and *F. glauca* are reduced to synonyms of the species *F. parviflora* Lam., of which one variety only is admitted, *β segetalis*, founded on a purplish-flowered plant, with unusually large sepals, received from Granada, in Spain. The description of the type agrees essentially with that of Lamarck but is more precise ; and the fruits are diagnosed as "ovato-subrotundis acuminatis tuberculato-rugulosis," and figured as subrotund and shortly pointed.

Haussknecht, in dealing with these plants, maintains Lamarck's species and Hammar's *β segetalis*; and adds two other varieties, *γ latisecta*, with lanceolate leaf-segments, found in Dalmatia and Arabia, and *δ sinaitica*, a low, almost cæspitose form, collected by Boissier in Arabia. Of the species, as commonly seen in Europe, he recognizes no varieties, but gives three forms, a. *erecta*, b. *diffusa* and c. *umbrosa*, which are more or less analogous with his forms of *F. officinalis* and regarded really as states dependent on environment. *F. leucantha* Viv. is referred to *F. diffusa*, and *F. glauca* Jord. to *F. umbrosa*; and no mention is made of differences in the fruits.

A somewhat similar treatment of the species, as found in Spain, is adopted in Willkomm & Lange's *Flora Hispanica* (1880), where Haussknecht's forms *erecta* and *umbrosa* are inserted as varieties, in addition to var. *segetalis* Hamm.; and another allied plant, collected in Aragon, is distinguished as a new species, *F. cæspitosa* Losc.

In Clavaud's Fl. de la Gironde (1882) an altogether different system of classification is adopted, and the species is divided into three varieties, *viz.*, a. *leucantha*, diffuse in habit and not very glaucous, leaf-segments long and not subcapillary, flowers white, and fruit subglobular and obscurely mucronate; b. *glauca*, dwarfer and very glaucous, with leaf-segments short and subcapillary, flowers white or rosy, and fruit nearly as obtuse as in a.; and c. *acuminata*, similar to b. in habit, foliage, and flowers, but with fruit clearly ogivale and mucronate, with less marked apical pits. The first two varieties are further subdivided into forms based on variations of the sepals. A figure is furnished showing the differences in the sepals and fruits, and exsiccata are quoted for the varieties *glauca* and *acuminata*.

According to Rouy & Foucaud s Fl. de France (1893) the French forms of this species, other than the type, are a subvariety *acuminata* (Clavaud), a var. *β umbrosa* (Haussk.), and var. *γ glauca* (Jord.); and Nicotra, in Le Fumar. Ital. (1897), practically follows Clavaud for the Italian forms, making *F. leucantha* a synonym of the type, which is characterized as "F. . . . caulibus . . . diffusis vel adscendentibus . . . acheniis . . . globosis . . . vix mucronulatis," and adding var. *β glauca* (= *F. glauca* Jord.), which is said to be "Humilis . . . intense glauca . . . foliorum segmentis abbreviatis . . . racemis densioribus, acheniis conspicue carinatis."

In British botany *F. parviflora* has continuously found a place in our Floras since its introduction by Smith and Sowerby in 1799, but I can trace only one attempt to distinguish any of its varieties. This is in Babington's paper of 1840, where, after describing briefly and figuring, after Reichenbach, *F. parviflora* Lam. (of which he states he had seen no native specimens), Babington proceeds to describe, as a British species, *F. Vaillantii* Lois. The plant that he diagnoses and figures, however, and which he thought to be plentiful throughout England, has almost capillary leaf-segments and white flowers, and is obviously not *F. Vaillantii* but a form of *F. parviflora* with obtuse fruits. It is in fact a form which I have seen from Cambridge in several herbaria, and which I myself gathered at Cherry Hinton in 1898.

This plant was redescribed by Babington in 1844, in Eng. Bot. Suppl. 2877, as *F. Vaillantii*, with a second red-flowered form added that is not referable to *F. parviflora*; and both forms are depicted together on the plate as belonging to *F. Vaillantii*, although the dissections show the bracts, flowers and fruits to be quite distinct. This curious mistake was adjusted by Syme in Eng. Bot. ed. 3, where, with amended descriptions, the figure of Babington's original white-flowered *F. Vaillantii* is transferred to *F. parviflora*, and stands by the side of the acuminate-fruited plant of Rayer, from which the dissections are removed. Syme, however, does not distinguish these forms of *F. parviflora* as varieties.

With these conflicting views on the status of the variations of this species, I have found considerable difficulty in deciding how to arrange the forms inhabiting Britain. The original plant of Lamarck, which I have not seen, was clearly glaucous, diffuse and sometimes rampant, with white flowers; and its fruits were probably not conspicuously pointed. As it appears to have been cultivated, it may not have been normal; but a large number of S. European specimens that I have examined, which have well-developed flowers and no appearance of abnormality, possess characters that accord perfectly with Lamarck's description, combined with subrotund fruits either shortly pointed or obtuse; and I therefore think, with the majority of authors down to Nicotra, that the specific type must be regarded as a plant of this kind. This form is no doubt identical with Clavaud's var. a. *leucantha*, which is presumably intended to be *F. leucantha* Viv. But as Viviani's plant was particularly distinguished by not having acuminate fruits, it would seem preferable to restrict this name to a form of the type with fruits lacking an apiculus, in accordance with the suggestion of Grenier & Godron.

Other Continental specimens in various herbaria are distinctly more compact and erect in habit, with more glaucous foliage cut into shorter and more channelled segments, and generally rosy-tinted flowers. Their fruits are hardly separable from those of the laxer form, but I doubt whether they ever assume a really diffuse and rampant habit, and they seem to me varietally distinct. Such plants I believe to be identical with *F. glauca* Jordan, of which there are authentic examples in Herb. Mus. Brit. I cannot see though that *F. glauca* differs from *F. parviflora* sufficiently to be regarded as a distinct species, and so I think these plants are best named var. *glauca* Clavaud.

A few other foreign—chiefly French and German—specimens differ again in that this dwarf habit and very glaucous foliage are combined with finer leaf-segments and fruits not subrotund but rather broadly ovate and more or less ogivale or acuminate. As a fruit-distinction of this kind does not seem readily attributable to environment I am disposed to follow Clavaud in separating such plants as a variety *acuminata*, although I suspect that this form passes at least into var. *glauca*.

It will be noticed that, in adopting these varietal names, I do not agree with Haussknecht in regarding all these plants, with the exception of vars. *segetalis*, *latisecta*, and *sinaitica*, as simply states of one species. Such a view seems to me untenable when the variations of the fruit are considered, and moreover, so far as my experience goes, the dwarf, extremely glaucous forms never become truly rampant.

Of plants like var. *glauca*, which is apparently a South European form, I have seen no British examples, but the somewhat similar form described and figured in Eng. Bot. 590 is perhaps our commonest form of the species. This agrees, so far as can be seen, with the exsiccata, F. Schultz, Herb. Norm. 415 et bis, quoted by Clavaud for his var. c. *acuminata*, and I think, judging also from his description and figure, that this name may be safely adopted as representing a British plant. According to the material I have seen, this variety is uncommon on the Continent, and found chiefly towards the west, particularly in Spain, France, and Germany.

There also occur in several British localities plants approximating to the specific type as defined above, much laxer in habit and less glaucous, with larger leaf-segments, whiter flowers, and more globular and shortly pointed fruits.

Furthermore, the Cambridge plant originally referred to *F. Vaillantii* by Babington remains to be included. This form seems intermediate between the type and var. *glauca* in habit and foliage, with the white flowers of the former and unusually long sepals, rhomboidal in outline rather than ovate or orbicular. But, as already indicated, it is chiefly distinguished by its fruits, which, though shortly pointed when young, become obtuse at maturity, and when dry, show the keel drawn into a very short, blunt and notched beak, almost presenting the aspect of a miniature caryopsis of *F. occidentalis*. The plant is no doubt closely allied to Viviani's *F. leucantha*, but in all the herbarium specimens that I have seen the distinctly notched fruit is constant, and considering also its relatively large sepals and intermediate habit, it seems desirable to give it varietal distinction. As it was first correctly placed under *F. parviflora* by Syme it may be suitably distinguished as var. *Symei*.

It may be mentioned, as a curious coincidence, that this species simulates *F. occidentalis* not only in one form of its fruits, but in the usual coloration of its corolla, these being the only two fumitories, I believe, in which the wings of the upper petal are blotched externally with dark red with clear white margins.

The synonymy, description, and distribution of *F. parviflora* are as follows:—

F. PARVIFLORA Lamarck, Encyclop. Méthod. ii. p. 567 (1788); Handschuch, De Plant. Fum. p. 38 (1832); Koch, Syn. Fl. Germ. ed. 2, p. 1018 (1845); Gren. & Godr. Fl. de Fr. i. p. 69 (1847); Hamm. Mon. p. 16 (1857); Haussknecht in

Flora, p. 456 (1873); Willkomm & Lange, Fl. Hisp. iii. p. 884 (1880); Clavaud, Fl. de la Gironde, p. 52 (1882); Rouy & Foucaud, Fl. de Fr. i. p. 181 (1893); Nicotra, Le Fumar. Ital. p. 69 (1897).

F. leucantha Viviani, Fl. Corsicæ Diagn. p. 12 (1824).

F. tenuisecta subsp. *F. parviflora* Syme, Eng. Bot. ed. 3, i. p. 114 (1863).

[*F. glauca* Jord. Pugillus, p. 8 (1852) = a variety not known in Britain.]

Icones.—Reichb. Icon. Fl. Germ. 4451 (with very large sepals); Hamm. Mon. tab. ii. fig. 3; Clavaud, Fl. de la Gironde, pl. 4, fig. 4.

Exsiccata.—Fiori et Béguinot, Fl. Ital. Exsicc. ser. ii. no. 1051! Heldreich, Herb. Græc. Norm. no. 1206 (as f. *umbrosa*)!

A plant of generally *robust* habit and more or less branched, *suberect, diffuse or* occasionally *climbing* by its cirrhose petioles (f. *umbrosa* Haussk.). Leaves irregularly 2–3 pinnatisect, *glaucous*, with *leaflets* cut into *linear*, acute *lobes*, which are normally *channelled* but become flattened and elongate in shade. *Racemes* dense in flower but *lax in fruit*, often *rather many-* (sub 20) *flowered, subsessile* or rarely shortly peduncled. *Bracts* linear-oblong, cuspidate, serrate above, whitish in colour, about *as long as the fruiting pedicels* but in shade-forms sometimes longer. *Fruiting pedicels* short, much dilated above, *straight* or flexuous, and *suberect. Sepals minute, about* 1 *mm. long and* $\frac{3}{4}$ *mm. broad, broadly ovate* or sometimes nearly orbicular, acute, irregularly *incise-dentate* or laciniate, whitish or rosy in colour, narrower than the corolla-tube and rather persistent. *Corolla* 5–6 *mm. long, white in colour* or occasionally flushed with pink, with the tip of the inner petals blackish red, and usually a contiguous *external blotch* of the same colour *at the base of the wings of the upper petal. Upper petal broad and much dorsally compressed*, with the green keel somewhat flattened, and spreading wings reaching the apex and forming a *truncate* but scarcely emarginate outline. *Lower petal with spreading margins*, narrow below but dilated towards the apex and becoming *ovate-spathulate. Fruits rather small*, barely exceeding 2 mm. in length and equally broad, *subrotund* with little lateral compression but distinctly keeled; *rounded-obtuse above, with* the keel drawn into a *short* but persistent *apiculus*, and slightly narrowed below to an obscure neck at least as broad as the tip of the thickened pedicel; when dry, *granular-rugose*, with obscure and shallow apical pits.

β ACUMINATA Clavaud, Fl. de la Gironde, p. 53 (1882).

Icon.—Clavaud, *l. c.* pl. 4, fig. 4.

Exsiccata.—F. Schultz, Herb. Norm. Cent. 5, no. 415 *bis*! E. S. Marshall, Eynesford, 1893, Herb. Mus. Brit.!

Dwarfer and more compact in habit than the type, and rarely, if ever, diffuse or climbing. Foliage *intensely glaucous*, with *finer*, sometimes subcapillary *leaf-segments. Flowers* generally *suffused with pink*, with rather more broadly winged outer petals than in the type. *Fruits* longer than broad, *subrotund-ovate*, and *ogivale* *or subacute* in profile, with usually a short, persistent apiculus and almost obsolete apical pits.

γ Symei, nov. var.

F. Vaillantii Babington in Trans. Bot. Soc. Edin. i. p. 36 (1840); Eng. Bot. Suppl. 2877, ex parte; nec alibi nec aliorum.

Icon.—Eng. Bot. Suppl. 2877 (white-flowered form).

Exsiccata.—A. G. More, Cherry Hinton, 1853, Herb. Mus. Brit.! G. C. Druce, Newmarket, 1904, Herb. Mus. Brit.!

Habitu inter typum et var. *acuminatam* medium fere tenet, foliorum laciniis brevioribus, crassioribus divaricatisque glaucissima. Flores sepalis circa 1½ mm. longis, ¾ mm. latis, ovalibus vel rhomboideis, præcipue supra medium dentatis; corollis anguste alatis, rarò roseo-albidis. *Fructus* subrotundi, juniores subapiculati, *carinâ* distinctâ *in rostrum emarginatum* brevissimum *productâ* tandem *obtusi.*

In habit intermediate between the type and var. *acuminata*, with very glaucous foliage and short, thick and sometimes divaricate leaf-segments. Flowers with oval or rhomboidal, acute sepals about 1½ mm. long and ¾ mm. broad, toothed chiefly above the middle; and narrowly winged corollas, rarely much tinted with pink. *Fruits* subrotund, subapiculate when young but at maturity *obtuse, with* the well-marked keel drawn into an extremely *short, blunt and notched beak.*

This plant is near var. *glauca* Clavaud (*F. glauca* Jord.), which differs in its dwarfer habit and still more glaucous foliage, in its denser racemes of pinker flowers, and in its subacute or apiculate instead of subemarginate fruits.

Distribution.—*F. parviflora* is one of the most widely distributed species of the genus, extending from the Canaries to North India, while, judging from the numerous examples in herbaria, it is extensively established in Mexico. The specimens that I have seen from localities east of Persia appear varietally distinct owing to their markedly rounded-obtuse or nearly truncate fruits, and other plants at Kew and the British Museum collected in India itself as *F. parviflora* diverge still further from the type and approach *F. Vaillantii*, to which species they have been referred by Haussknecht as var. *indica.*

F. parviflora is known from:—

Sweden (*Haussk.*). Germany! Belgium (*Haussk.*). France! Spain! Portugal! Corsica! Sardinia! Italy! Sicily! Istria (*Haussk.*). Dalmatia! Hungary (*Haussk.*). Transsilvania (*Nyman*). Greece! Turkey! Caucasus (*Haussk.*).

Asia Minor! Cyprus (*Hb. Kew*)! Syria! Arabia (*Hb. Kew*)! Mesopotamia! Transcaucasia! Persia! Afghanistan (*Hb. Kew*)! Beluchistan (*Hb. Kew*)! Kashmir (*Hb. Kew*)!

Egypt (*Hb. Kew*)! Tunis! Algeria! Morocco (*Hb. Kew*)! Canaries!

Mexico!

F. parviflora is unknown in the Channel Islands, and although recorded for Cape Clear Island by Haussknecht, is not considered by Mr. Praeger to be established in Ireland.

In Great Britain the species is almost exclusively a plant of arable land, and has been recorded in *Topographical Botany* and its Supplement for twenty-four vice-counties, mainly in the chalk districts of the south-east of England, but with a few localities outside this area, mostly in the south-east of Scotland. Specimens from fifteen of these vice-counties have lately passed through my hands, and I think the remaining records may be accepted as correct. In addition, the plant has been discovered in 9. Dorset; and 53. S. Lincs, must be further added to the list, Streatfield's specimen in Herb. Mus. Brit., labelled *F. Vaillantii*, being really *F. parviflora*. The vice-comital total is thus increased to twenty-six.

So far as my experience goes, the commonest form of the species in Great Britain is the variety *acuminata*, while the variety *Symei* is much rarer and seems especially characteristic of the Gogmagog Hills of Cambridge.

A list of localities noted for these different forms is appended:—

9. *Dorset:* Badbury Rings, *R. P. Murray*, 1904 (*Hb. Mus. Brit.*, type)! 14. *E. Sussex:* Stanmer Park, *T. Hilton* (*Hb. Mus. Brit.*, type)! Ovingdean, *T. Hilton* (v. *acuminata*)! 15. *E. Kent:* Woldham, Rochester, *J. Rayer*, 1792 (*Hb. Mus. Brit.*, v. *acuminata*)! Kent, *J. Rayer* (*Hb. Mus. Brit.*, type)! 16. *W. Kent:* Eynesford, *E. S. Marshall* (*Hb. Mus. Brit.*, v. *acuminata*)! Luddesdown, *Ridley* (*Hb. Mus. Brit.*, v. *acuminata*)! 17. *Surrey:* Mickleham (v. *acuminata*)!! Merrow Downs, *E. Armitage* (v. *acuminata)*! Hog's Back, *H. C. Watson* (*Hb. C. Bailey*, v. *acuminata*)! 19. *N. Essex:* Saffron Walden, *J. Groves* (*Hb. C. Bailey*, type)! 20. *Herts:* Ashwell, *E. Crespigny* (*Hb. C. Bailey*, v. *acuminata*)! 22. *Berks:* Streatley, *G. C. Druce* (*Hb. Mus. Brit.*, v. *acuminata*)! Lowbury Hill, *G. C. Druce* (v. *acuminata*)! 24. *Bucks:* Princes Risboro', *G. C. Druce* (*Hb. Mus. Brit.*, type)! Pitstone Hill, *C. E. Salmon* (*Hb. Mus. Brit.*, v. *acuminata*)! 29. *Cambridge:* Kennet (*Hb. Mus. Brit.*, type)! Gogmagog Hills (v. *Symei*)!! Newmarket, *G. C. Druce* (*Hb. Mus. Brit.*, v. *Symei*)! Snailwell (*Hb. Roffey*, type)! 30. *Bedford:* Hitchin, *T. B. Blow* (*Hb. Mus. Brit.*, v. *acuminata*)! 62. *N.E. Yorks:* Falsgrave (*Hb. Mus. Brit.*, type)! Malton, *J. G. Baker* (*Hb. C. Bailey*, type)! 82. *Haddington:* Dreny, *R. McKay* (*Hb. C. Bailey*, v. *Symei*)! 83. *Edinburgh:* Leith (*Hb. Mus. Brit.*, type)!

10. Fumaria Vaillantii Loiseleur.

Although much confused at different times in this country with the preceding species, *F. Vaillantii* was originally described with considerable lucidity and seems to have been generally understood on the Continent. Loiseleur's description was first printed in 1809 in Desvaux's *Journal de Botanique*, ii. p. 358, and his diagnosis runs:—"F. caule ramoso erectiusculo, foliis bipinnatis, pinnis 2–5 laciniatis, laciniis linearibus planis, racemis brevibus oppositifoliis, pericarpiis globosis subtuberculatis vix mucronulatis monospermis. F. lobis longioribus et angustioribus sparsis. Vaill. Bot. Par. 56, tab. 10, fig. 6." He adds that his plant, found near Paris, is allied to *F. parviflora*, but differs in its more erect habit, its flat instead of channelled leaf-segments, and its reddish instead of white flowers. The figure of Vaillant which he quotes shows a fumitory with leaves much less than usually decompound and few-flowered racemes of small flowers.

These salient features reappear in *F. Vaillantii*, as depicted in Reichenbach's Icones Fl. Germ. 4452, and a general agreement respecting them continues through the works of nearly all the Continental writers on these plants, from Handschuch to Nicotra, except that the peculiar leaf-cutting has been sometimes overlooked.

A Swiss fumitory allied to *F. Vaillantii* was distinguished as a new species, *F. Schleicheri*, in 1828 in Soyer-Willemet's *Observations sur quelques plantes de France*, p. 17, and of this the chief characters are said to be "siliculis globosis mucronulatis, pedicellis . . . bracteâ longioribus, racemis oblongis, floribus parvis rubris . . ." In Parlatore's Monograph, however, this name is reduced to a synonym of *F. Vaillantii*, and there is no mention of it in Hammar's work, where a fresh species, *F. tenuiflora*, is established, which is shown by Haussknecht to be the same plant as *F. Schleicheri*, as already mentioned in this paper in connection with *F. Wirtgeni*.

F. Schleicheri, which has a distribution extending from France to the Altai region of Central Asia, is a species easily recognizable by its long, slender pedicels with short bracts, its deeply coloured flowers, and its small, rotund, persistently apiculate fruits.

In 1852 another plant of this group was described as a new species, *F. Laggeri*, in Jordan's *Pugillus*, p. 7. This, too, is a Swiss plant, found at Zermatt, and after a detailed diagnosis, Jordan contrasts it with *F. Vaillantii*, from which it is stated to differ by its shorter and broader leaf-segments, larger and more ovate sepals, and broad, reflexed wings to the upper petal. No reference is made by Jordan to *F. Schleicheri*. In Hammar's Monograph *F. Laggeri* becomes "*F. Vaillantii*, *β Laggeri*.—Racemis longius pedunculatis, laxis, multi (congesti-) floris, sepalis aliquanto longioribus, triangularibus, floribus roseis."

A third Swiss plant related to *F. Vaillantii* appeared in 1861 in *F. Chavini* Reuter, in Cat. des Plantes vasculaires de Genève, p. 9. Reuter's description is less satisfactory than that of *F. Laggeri* by Jordan, but his plant is stated to be characterized by short and broad leaf-segments, combined with few-flowered racemes of erect, rosy flowers on more or less flexuous peduncles, and fruits larger and more rugose than those of *F. Laggeri*. Of this plant there are specimens at Kew and the British Museum, collected by Chavin on Mont Salève, which show that it is a form closely allied to *F. Vaillantii*, but with more divided leaves, longer racemes with slenderer and more erect pedicels, and lighter-coloured flowers with broader but not more reflexed wings to the upper petal. *F. Chavini* is made a variety of *F. Vaillantii* in

Rouy & Foucaud's Fl. de France—the most natural arrangement on the whole, I think, albeit the two plants show considerable difference at times in habit and foliage.

Of *F. Laggeri* there are Zermatt examples from Lagger, both at Kew and the British Museum, which are certainly small plants of *F. Schleicheri*; and of this species *F. Laggeri* is made a synonym by Rouy & Foucaud. Haussknecht, on the contrary, identifies *F. Laggeri* with *F. Chavini*, reducing the plant to a variety *Laggeri* of *F. Vaillantii*, and quoting both specific names in synonymy. But I cannot find that he gives any good reason for this view, and he admits that Lagger sent out *F. Schleicheri* as the plant in question; and as Jordan's remarks, especially those respecting the larger sepals and reflexed petal-wings, seem to point to *F. Schleicheri*, I think that the author's description and Lagger's specimens must be relied on, and agree with Rouy & Foucaud in regarding *F. Laggeri* Jord. as identical with *F. Schleicheri*. The confusion among these plants has apparently arisen owing to both *F. Schleicheri* and *F. Chavini* occurring at Zermatt, the *locus classicus* of *F. Laggeri*. I collected both of these plants growing in company close to the village in the summer of 1906.

It may also be concluded from Hammar's description and the absence of any allusion on his part to *F. Schleicheri* that his var. *Laggeri* is likewise that species and not the same as *F. Chavini*, and the earliest varietal name for the latter plant would therefore appear to be *F. Vaillantii* v. *Laggeri* Haussk. Hammar and Haussknecht thus designate two different plants by the same varietal name, and as the latter author, moreover, identifies his plant with *F. Laggeri* Jord., which I believe to be *F. Schleicheri*, I consider that the name *Laggeri*, to represent a variety, should be passed over altogether as one tending to confusion, and var. *Chavini* Rouy & Foucaud adopted in its place.

In addition to this plant Haussknecht establishes three other varieties of *F. Vaillantii*, viz., γ *indica*, an Asiatic form approaching *F. parviflora* in its finely divided foliage; δ *Schrammii*, described from German specimens, but since found in France and Spain and even in Asia; and ε *conferta*, a compact plant from Asia Minor. He also distinguishes forms (four in number), which are really states, as in *F. parviflora* and *F. officinalis*.

The most interesting of these variations, as an European plant, is var. *Schrammii*, which was first placed under *F. parviflora* by Ascherson in Verhand. des Bot. Vereins. Prov. Brandenburg, p. 221 (1863). This is a very slender form, with paler flowers than the type, short, slender pedicels, and smaller, less rugose fruits with a persistent apiculus. Its foliage, to my eyes, resembles that of var. *Chavini*, and I suspect there may be gradations between the two varieties, as Haussknecht thought there were between v. *Chavini* and the type.

The variety *Schrammii* is maintained by Rouy & Foucaud, and is shown also in Willkomm & Lange's *Flora Hispanica*.

It is strange that, although specimens closely allied to these varieties have been extensively distributed from North Italy, no allusion is made by Nicotra to either *F. Laggeri* or *F. Chavini.*

As a British plant *F. Vaillantii* appears to have been first described by Arnott in Report Bot. Soc. Edin. p. 104 (1840). The description furnished leaves much to be desired, and, rather curiously, Eng. Bot. 590 (*F. parviflora*) is quoted in illustration, but in spite of this I am inclined to think the plant intended was true *F. Vaillantii.* A little later Babington described under this name the Cambridge variety of *F. parviflora*, which, as already explained, he subsequently associated (Eng. Bot. Suppl. 2877) with another red-flowered form not referable to Lamarck's species. Specimens of these two forms appear to have been distributed by Babington, for Haussknecht, in his account of *F. parviflora*, remarks that he had seen from Sonder's herbarium Babington's Cambridge examples of *F. Vaillantii*, which were partly *F. parviflora* and partly *F. Vaillantii* var. *Laggeri* (= var. *Chavini*).

As Haussknecht thus refers a Cambridge specimen to *F. Vaillantii* var. *Chavini*, it becomes necessary to consider the probability of its being a British form, and on reflection I think that Babington's red-flowered figure in Eng. Bot. Suppl. 2877 really depicts this variety rather than the type of *F. Vaillantii.* A specimen of Babington's in Herb. Mus. Brit. labelled "Gogmagog Hills," without date, also seems to be var. *Chavini*, and I have another, collected on Fleam Dyke by Mr. Hiern, that is very similar. There is a plant of the same form at Kew also, labelled "*F. Vaillantii*, Littlebury, near Saffron Walden, J. S. Mill, 1867." These British specimens do not exactly match well-grown Swiss examples of *F. Chavini*, inasmuch as their outer petals are more narrowly winged. But they show the same kind of leaf-cutting, which separates them from ordinary *F. Vaillantii*, and as finely developed corollas might be expected in Alpine situations, the floral differences may be attributed to environment, and I consequently follow Haussknecht in regarding them as states of var. *Chavini* and so adding this name to the British list.

It may be desirable to point out that *F. Vaillantii*, in an aggregate sense, differs essentially from *F. parviflora* in its slenderer habit, uniformly flat leaf-segments, shortly peduncled and not subsessile racemes, shorter and narrower bracts, narrower sepals, pink instead of white corollas, with the upper petal clearly emarginate, and more rounded and less distinctly keeled fruits.

The description, &c., of *F. Vaillantii* follows:—

F. VAILLANTII Loiseleur in Desvaux Journ. Bot. ii. p. 358 (1809), and Notice, p. 102 (1810); Handschuch, De Plant. Fum. p. 37 (1832); Koch, Syn. Fl. Germ. ed. 2, p. 1018 (1845); Gren. & Godr. Fl. de Fr. i. p. 69 (1847); Hamm. Mon. p. 14 (1857); Haussknecht in Flora, p. 441 (1873); Willkomm & Lange, Fl. Hisp. iii. p. 883 (1880); Clavaud, Fl. de la Gironde, p. 51 (1882); Rouy & Foucaud, Fl. de Fr. i. p. 180 (1893); Nicotra, Le Fumar. Ital. p. 67 (1897).

F. tenuisecta subsp. *F. Vaillantii* Syme, Eng. Bot. ed. 3, i. p. 113 (1863).

Icon.—Reichb. Icon. Fl. Germ. 4452; Hamm. Mon. tab. i. fig. 3 (with abnormally broad sepals); Clavaud, Fl. de la Gironde, pl. 4, fig. 3.

Exsiccata.—F. Schultz, Herb. Norm. Cent. 5, no. 414! Paulin, Fl. Exsicc. Carniolica, no. 2871! Salmon & Wallis, Pitstone Hill, Bucks, 1904, Herb. Mus. Brit.!

A plant of rather dwarf and normally *slender* habit, sometimes very much branched with numerous, short, interlacing stems, usually *suberect* and rarely, if ever, climbing. *Leaves* irregularly 2-*pinnatisect*, *glaucous*, with long petiolules and relatively few and distant *leaflets* cut into *flat*, acute, *linear-oblong* or lanceolate *lobes* somewhat narrower, on an average, than those of *F. officinalis*. *Racemes* rather *lax*, *few-* (generally 6-12) *flowered*, *exceeding* the short *peduncles*. *Bracts* linear-lanceolate, acuminate, *about three-fourths as long as the fruiting pedicels*, which are usually short, straight, dilated above, and *suberect or erect-spreading*. *Sepals minute*, *not exceeding* 1 *mm. long and* $\frac{1}{3}$–$\frac{1}{2}$ *mm. broad*, *lanceolate*, *acuminate*, more or less *laciniate-serrate*, sometimes persistent on the young fruit. *Corolla* 5–6 *mm. long*, *pink in colour*, with the tip of the inner petals blackish red and the *wings* of the upper petal often *obscurely* tinted with the same *dark* hue. *Upper petal dorsally compressed*, with thick, green keel and broad, spreading wings almost reaching its apex and much developed above, forming an *emarginate* but apiculate outline. *Lower petal with spreading margins* narrow below but abruptly dilated towards the apex and becoming *truncate-spathulate*. *Fruits rather small*, about 2 mm. long and equally broad, *subrotund*, laterally compressed but obscurely keeled, and almost equally narrowed above and below to a *rounded-obtuse* apex and a very obscure neck about as broad as the tip of the pedicel; when dry, *granular-rugose*, with small and shallow apical pits.

β Chavini Rouy & Foucaud, Fl. de Fr. i. p. 181 (1893).

F. Chavini Reuter in Cat. Plant. Genève, p. 10 (1861).

F. Vaillantii Eng. Bot. Suppl. 2877, ex parte.

F. Vaillantii β Laggeri Haussk. in Flora, p. 442 (1873), nec Hammar nec *F. Laggeri* Jord.

Icon.—Eng. Bot. Suppl. 2877 (red-flowered form).

Exsiccata.—Billot, Fl. Exsicc. Cont. no. 3508 (poorly represented in Herb. Mus. Brit.)! C. C. Babington, Gogmagog Hills, Herb. Mus. Brit. (as *F. Vaillantii*)!

More robust and erect than the type, but less branched, with glaucous or green, *more decompound* (irregularly 2–3 pinnatisect) *leaves*, and more numerous and less distant leaflets cut into flat, linear-oblong or linear lobes. *Racemes* generally 10–16-flowered, *denser* than in the type, with the *pedicels* rather *longer and slenderer*, often flexuous, never much spreading, and sometimes almost erect and parallel with the rachis. Flowers more brightly coloured than in the type, and fruit slightly larger and more distinctly granular-rugose.

Distribution.—Like *F. parviflora*, this species enjoys a very wide distribution, occurring throughout Europe, except the extreme north, and extending across Asia through Turkestan and Mongolia to Manchuria. It is also found throughout the Indian Peninsula, where, according to Hooker & Thompson's *Flora Indica*, it is common on the plains outside the tropics and on the subtropical mountains.

It has already been mentioned that the Indian plant differs from the type and has been referred to a var. *indica* by Haussknecht, according to whom the plant extending from Turkestan to Manchuria is the same variety. I have seen no Central Asian examples from localities east of Samarkand, one specimen from the Altai region labelled *F. Vaillantii* being really *F. Schleicheri*. No African specimen of this species has come under my notice.

F. Vaillantii is recorded for :—

Sweden (var. *Chavini*)! Denmark (*Haussk.*). Germany (with var. *Chavini*)! Tyrol! Switzerland (with var. *Chavini* !!)! Belgium (*Haussk.*). France (with var. *Chavini*)! Spain (*Hb. Kew*)! Portugal (*Haussk.*). Corsica (*Haussk.*). Sardinia (*Haussk.*). Italy! Sicily (*Hb. Kew*)! Austria! Hungary (*Hb. C. Bailey*)! Turkey (*Haussk.*). Greece (*Haussk.*). Russia (*Hb. Kew*)! Crimea! Caucasus (*Hb. Kew*)!

Transcaspia (*Hb. Kew*)! Asia Minor! Syria (*Haussk.*). Mesopotamia (*Haussk.*). Persia! Beluchistan (var. *indica*—*Haussk.*). Afghanistan (var. *indica*—*Haussk.*). Cashmir (*Hb. Kew*)! India (var. *indica*)! Turkestan! Altai (*Haussk.*). Mongolia (var. *indica*—*Haussk.*). Songarei, Manchuria (var. *indica*—*Haussk.*).

Tunis (*Haussk.*). Algeria (*Haussk.*). Canaries (*Haussk.*).

F. Vaillantii is not known in the Channel Islands and is not recognized by Mr. Praeger as an Irish plant.

In Great Britain it is almost entirely an inhabitant of arable land, and is rarely met with away from the chalk districts, showing a predilection for calcareous ground, which has frequently been remarked on the Continent. Records for sixteen vice-counties are shown in *Topographical Botany* and its Supplement, but of these I think three should be deleted, *viz.*: 53. S. Lincs, Streatfield's specimen being *F. parviflora*; 66. Durham, the record probably referring to a casual only on ballast hills; and 26. W. Suffolk, the record in the Flora being referred by Mr. C. E. Salmon to *F. parviflora*. Specimens from nine of the remaining thirteen vice-counties have come under my observation, the exceptions being East and West Kent, N.E. Yorks, and Linlithgow; and, in addition, I have seen specimens from 7. N. Wilts (Devizes, E. S. Marshall, 1904), 24. Bucks (Pitstone Hill, *Salmon & Wallis*, 1904), and 33. E. Gloster (Leckhampton, *Hb. St. Brody*). The number of vice-counties for the species is thus restored to sixteen.

Of the variety *Chavini* the only certain British examples that I have seen are those already mentioned from Cambridge and North Essex, but I am somewhat doubtful whether Mr. Marshall's plants from Wilts, which, so far as I have seen, are very young and dwarf, may not belong to the same variety.

ARTIFICIAL KEY OF THE BRITISH SPECIES AND VARIETIES.

1 Leaf-segments flat, never so narrow as linear and usually much broader; flowers normally exceeding 9 mm. in length; lower petal never distinctly spathulate (except in × *F. Painteri*); fruit smooth or rugose when dry 2
Leaf-segments channelled or flat, rarely much broader than linear; flowers less than 9 mm. in length; lower petal distinctly spathulate; fruit more or less rugose when dry 12

2 Flowers very large; lower petal with broad, spreading margins; fruit large, coarsely rugose and shortly beaked .... *F. occidentalis.*
Flowers large, with large sepals; lower petal with narrow, erect margins; fruiting pedicels rigidly recurved; fruit small or of moderate size, smooth or nearly so, truncate or very obtuse, with a distinct fleshy neck when fresh 3
Flowers large or of moderate size, with smaller sepals; lower petal with narrow, erect or spreading margins; fruiting pedicels straight or flexuous; fruit small or of moderate size, smooth or rugose, obtuse or subacute, with an indistinct fleshy neck 6

3 Corolla white; upper petal narrow, laterally compressed, with wings not exceeding the keel; fruiting pedicels arcuate-recurved 4
Corolla pinkish; upper petal broader, not laterally compressed, with wings exceeding the keel; fruiting pedicels patent-recurved or divaricate; fruit truncate and generally broader than in 4 5

4 Sepals more or less broadly oval; fruit small, smooth, rounded-obtuse .... *F. capreolata typica.*
Sepals generally narrower; upper petal more acute, with smaller wings; fruit of moderate size, less smooth, truncate and somewhat rectangular....................... *F. capreolata* v. *Babingtonii.*
Flowers as in var. *Babingtonii*; fruit rounded-obtuse as in the type, but less smooth, broad, and much larger
F. capreolata v. *devoniensis.*

5 (3) Bracts as long as the fruiting pedicels or the lowest longer; sepals half as long as the corolla, oblong, generally subentire
F. purpurea typica.
Bracts very broad and shorter than the fruiting pedicels; sepals shorter, broader and more toothed ... *F. purpurea* v. *brevisepala.*

6 (2) Sepals oval, serrate; upper petal laterally compressed; lower petal with spreading margins; fruit rugose 7
Sepals oval or ovate, subentire or dentate; upper petal more or less dorsally compressed; fruit smooth or rugulose 8

7 Wings of upper petal pink like the rest of the corolla; fruit generally subacute and hardly narrowed below .... *F. Bastardi typica.*
Wings of upper petal blackish red; fruit smaller, more rounded above and narrowed below .... *F. Bastardi* v. *Gussonei.*
Habit laxer and leaf-segments broader than in the type; outer petals very acute with wings of the upper one blackish red
F. Bastardi v. *hibernica.*

8 (6) Flowers large; sepals oval, subentire; lower petal with very narrow, spreading margins; fruit rather large, subrotund, subacute, smooth or nearly so .... *F. paradoxa.*
Flowers rather large; sepals ovate-lanceolate, dentate; lower petal subspathulate, with spreading margins; fruit of moderate size, truncate, apiculate, slightly rugulose .... × *F. Painteri.*
Flowers of moderate size or large; sepals broadly oval or ovate, more or less dentate; lower petal with erect margins 9

Habit robust; bracts shorter and broader than in 10 and 11; flowers of moderate size; sepals broadly oval, subentire; fruit rather small, shortly obovate, almost truncate and nearly smooth *F. muralis* subsp. *neglecta.*
9 Habit very slender; flowers of moderate size; sepals ovate, toothed; fruit small, subrotund-ovate, subacute or apiculate, smooth... 10
Habit robust or slender; flowers large or of moderate size; sepals usually larger, ovate, toothed; fruit of moderate size or rather small, obovate, obtuse, often obscurely rugulose.................. 11

Fruit very small .... *F. muralis typica.*
10 Flowers rather larger; fruit distinctly larger, but still rather small *F. muralis* v. *decipiens.*

(9) Habit robust; flowers large; fruit of moderate size *F. muralis* subsp. *Boræi typica.*
Habit robust; flowers rather smaller with narrower sepals; fruit of moderate size, hardly narrowed below *F. muralis* subsp. *Boræi* v. *ambigua.*
11 Habit slender; fruiting pedicels variable in direction; flowers rather smaller than in the type, but with relatively longer bracts and sepals; fruit of the type ... *F. muralis* subsp. *Boræi* v. *gracilis.*
Habit slender; flowers of moderate size, with smaller sepals; fruit rather small, subrotund-obovate *F. muralis* subsp. *Boræi* v. *britannica.*

(1) Leaf-segments linear, channelled; sepals broadly ovate, nearly half as long as the corolla; fruit subglobose ...... *F. micrantha.*
12 Leaf-segments broader, flat; sepals narrowly ovate, about one-third as long as the corolla; fruit truncate or emarginate 13
Leaf-segments linear or nearly so, flat or channelled; sepals minute; fruit rounded or subacute 14

Habit robust; racemes many-flowered; fruit distinctly broader than long .... *F. officinalis typica.*
Habit rampant; racemes very many-flowered, with slender pedicels, short bracts and paler flowers; fruit smaller and rounder *F. officinalis* v. *elegans.*
13 Habit less robust; racemes fewer-flowered; flowers smaller, with relatively smaller sepals; fruit of the type... *F. officinalis* v. *minor.*
Habit slenderer; racemes fewer-flowered; flowers smaller, more broadly winged, with smaller sepals; fruit about as broad as long, apiculate .... *F. officinalis* v. *Wirtgeni.*

(12) Leaf-segments flat; racemes shortly peduncled; bracts acuminate, shorter than the fruiting pedicels; fruit subrotund, obscurely keeled 15
14 Leaf-segments normally channelled; racemes subsessile; bracts broader, cuspidate, as long as the fruiting pedicels; fruit distinctly keeled 16

Leaves 2-pinnatisect, with distant leaflets; racemes about 6–12-flowered; pedicels short, suberect or erect-spreading
15 *F. Vaillantii typica.*
Leaves 2–3-pinnatisect, with closer leaflets; racemes about 10–16-flowered; pedicels longer and more erect *F. Vaillantii* v. *Chavini.*

(14) Robust and diffuse in habit, with ample glaucous foliage; flowers usually white; fruit subrotund, apiculate... *F. parviflora typica.*
Dwarf in habit, with finely cut, intensely glaucous foliage; flowers
16 often flushed with pink; fruit subrotund-ovate, subacute *F. parviflora* v. *acuminata.*
Intermediate in habit, with very glaucous foliage and short leaf-segments; flowers usually whitish; fruit subrotund, obtuse, with a very short, notched beak .... *F. parviflora* v. *Symei.*

APPENDIX.

Fumaria muralis Sonder (sensu stricto).—In recently examining the parcel of *F. parviflora* from the Orient at Kew, I remarked three specimens of *F. muralis* which throw a most interesting light on its geographical distribution. One of these was collected in Mauritius, at an altitude of 1100 ft. Another—a good and characteristic example—is labelled "*F. officinalis*. Java, prope Ngodisari, alt. 2000 m. Legit S. H. Koorders, 30. x. 1899. Herb. Kds. 37689 β," and appears under the same name in the recent Flora of Java. A third specimen is labelled "1987, New Zealand. Colenso. 'This I believe to be an emigrant.'"

F. muralis thus occurs at Hamburg, Bordeaux, Portugal, Madeira and other Atlantic islands, Ascension, St. Helena, South Africa, Mauritius, Java, and New Zealand; and the explanation of such a distribution, I think, can only be that the plant was carried from its Atlantic headquarters northwards into Europe and southwards round Africa to the East Indies through the traffic of the old Dutch East India Company in the seventeenth and eighteenth centuries. It will be remembered, not only that Cape Colony was formerly Dutch, but that Mauritius was once held by Holland, and the Dutch were the first to visit New Zealand.

Fumaria paradoxa Pugsley. — Since describing this plant three more specimens have come to my notice in the very fine foreign herbarium of Mr. C. Bailey. One of these (C. Magnier, Plant. Gall. Septent. et Belg. no. 253) was collected as *F. Borœi* in 1880 by E. Tardieu at Gatteville, Manche. Mr. Bailey's sheet shows two pieces of *F. paradoxa* associated with one of *F. Borœi*. The second specimen, an excellent one (C. Magnier, Fl. Select. Exsicc. no. 1075), also comes from the North of France, having been collected by E. Martin in 1884 at Romorantin, Loir-et-Cher. This plant was recognized as closely allied to *F. muralis* and *F. Borœi*, and was submitted to Clavaud, who thought it a distinct species and dedicated it to Martin, but without ever publishing a description. Mr. Bailey's remaining specimen is from a fresh Spanish locality:—"F. Sennen, Plantes d'Espagne, no. 14. *F. muralis* Sond. var. *Paui* Sennen, var. nova—Castille. Ameyugo, Ayuelas, Pancorbo, haies. 1906, Mai et Juin. Fres. Sennen et Elias." I cannot trace that this varietal name has ever been validly published.

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Generic divisions are shown in small capitals; British plants in ordinary small type; foreign plants and synonyms in italics.

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ERRATA.

Page 5, line 45, for "lip" read "tip."
,, 7, ,, 3, for "The" read "—the."
,, 9, ,, 7, for "1850" read "1847."
,, 10, ,, 5, for "Exiccata" read "Exsiccata."
,, 14, ,, 37. I learn from Mr. Riddelsdell that his locality is Manston, near Leeds, and not the place of the same name in Dorset. Vice-county 64 should therefore be substituted for vice-county 9.
,, 20, ,, 25, for "suspecies" read "subspecies."
,, 25, ,, 23, after "*F. Boræi*, subsp." add "Pugsley in Journ. Bot. xl. p. 178 (1902)."
,, 28, ,, 37, for "Bickeno" read "Bicheno."

AN ENUMERATION OF THE BRUNIACEÆ.

By R. A. DÜMMER.

In 1817 Robert Brown defined the order Bruniaceæ in which he included the genera *Brunia*, *Staavia*, *Linconia*, *Thamnea*, and *Erasma*,* and indicated its affinities to the Hamamelideæ, a systematic position which it has retained up to the present day. Nevertheless, in other floral characters and in their anatomical peculiarities the species collectively claim their recognition as a distinct group.† The polymorphism and the varied cases of mimicry which prevail in the order form one of its most striking and interesting features, while the distribution of the species does not lack in interest. These, which are wholly South African,‡ number about seventy, and are scattered over twelve genera, two of which are monotypic.

The remarkable resemblance of *Audouinia capitata* to certain *Ericæ* of the § Callista, or of *Raspalia Schlechterii* to the small white-flowering *Erica margaritacea* is paralleled by *Staavia globosa*, the apparent likeness of which to several Phylicas makes dissection an absolute necessity. Similarly, the Compositæ are mimicked by various Staavias, notably *S. Dodii*, *S. Brownii*, and *S. glutinosa*, the first-named simulating a shrubby Chrysanthemum in many respects. The genus *Lonchostoma* has masked its affinity by assuming the guise of certain South African Thymelæaceæ, while *Thamnea thesioides* bears a superficial similarity to various *Thesia*.

Their xerophily is well shown in their more or less dwarfed shrubby habit, the vertical position of the twigs, their restricted leaf surface and oftentimes its silicification, the disposition of the ericoid, pinoid, or myrtoid corky-tipped leaves, the paucity of the stomata, and their limitation often to that side of the leaf appressed to the stem. As accessories, parenchymatous cells serving for water storage are present at the apices of the leaves near the termination of the veins, while hairs of a straggly or more compact nature render effective service in retarding transpiration, and incidentally lessen the deleterious effects of intense isolation or extremes of temperature.

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* Till recently the status of *Erasma* was a matter of conjecture, but an inspection of the specimens at the British Museum shows it to be congeneric with *Lonchostoma*.

† This is confirmed by a recent study of the ovule. *Cf.* Saxton in Trans. Roy. Soc. S. Africa, ii. i. 27–30 (1910).

‡ Brongniart mentions that Commerson gathered *Berzelia lanuginosa* in Madagascar, but this is erroneous.

Anatomically the order has been investigated by Thouvenin,* Solereder,† Knoblauch,‡ Colozza, and Kirchner.§ The last-named author lays special stress upon the occurrence of a corky leaf-tip, and maintains it to be one of the most characteristic points in connection with the Order.|| According to Kirchner, these tips are formed by a cap of tissue of brown (or black) corky cells, on the inner side of which lies a meristem, from which new cork-cells are produced as the outermost ones become exfoliated; in *Audouinia* this meristematic tissue becomes inactive early in life. Kirchner is of opinion that these corky leaf-tips materially assist in diminishing the harmful effects of intense sunlight, and incidentally also curtail the surface for transpiration. Differences in the distribution of the stomata, which individually are surrounded by from five to seven companion-cells, are correlative with various species, thus:—

In *Pseudobæckea virgata*, *P. sacculata*, *P. palustris*, *Raspalia angulata*, *R. Dregeana*, *R. microphylla*, *R. passerinoides*, and *R. squalida*, as well as in the majority of Nebelias and *Brunia nodiflora*,¶ they are confined to the appressed upper leaf-surface or occasionally on the lower, in the region where the tips of the preceding leaves overlap. Conversely, the stomata are restricted to the lower side of the leaves in *Linconia cuspidata*, *Thamnea gracilis*, and *Pseudobæckea cordata*; but in *Thamnea depressa* Oliv. and *Pseudobæckea racemosa* they are distributed on both sides, with a preponderance, however, on the lower surface in the case of the latter species. Generally they are irregularly scattered, but in the leaves of *Staavia radiata*, *S. capitella*, and *Pseudobæckea palustris* they exhibit a marked transverse arrangement.

The leaves are traversed by from three to twenty veins, according to Colozza; the hairs which invest those of certain species are always unicellular. The minute, many-celled processes which are disposed laterally at the insertion of the pinoid leaves of *Staavia* are of considerable biological interest; they were first detected by Baillon,** and are easily discerned on living plants as black prominences. Kirchner †† has seen them also on *Berzelia*, and less conspicuously on *Linconia cuspidata*; and their inter-

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* Ann. Sci. Nat. xii. 1890, pp. 148–152, pl. 22.

† Holzstruktur, 118–119, 1885. Syst. Anat. Dic. 377–379, and pp. 657–658, 1898; Supp. 133–134, 1908: Engl. Trans., by Boodle & Fritsch, i. 333–335, and pp. 581–582, 1908; ii. 914–915, 1908.

‡ Okölog. Anat., &c., Habilitat.—Schr. Tübingen, 1896, pp. 15 *et seq.*

§ *Beiträge Kentniss der Brunia.* Breslau, 1904, pp. 1–29.

|| *Op. cit.*

¶ Kirchner, *op. cit.*

** Baillon, Hist. Pl. iii. 385.

†† *Op. cit.* p. 28.

preted homology to stipules is entitled to consideration. Solitary or clustered crystals of calcium-oxalate occur throughout the order, except in *Raspalia*.

Compared with the South African flora, as a whole, the Bruniaceæ do not constitute an important element in the vegetation, owing to the fewness of species and their limited distribution. What is lacking in species is often counterbalanced by the number of individuals in certain cases, as instance the well-nigh impenetrable thickets of *Berzelia lanuginosa* on Table Mountain, where this species attains to a height of six to ten feet, associated with the blue-flowering *Psoralea aphylla* and *P. pinnata* and various Restiaceæ; it abounds near mountain-streams and in swampy localities on the Cape Peninsula, Stellenbosch, and the Caledon mountain ranges, and flowering from July to October, when the naked, compact, subglobose, cream or sulphur-coloured flower-heads form a conspicuous feature of the landscape. Marloth, in his excellent work on the Cape Flora, depicts such a scene on the edge of the Knysna Forest, near Balmoral.

The exserted stamens and quantity of pollen of the Berzelias and allied Brunias suggest that they are partially wind-pollinated, but in the absence of any definite experiments this remains speculative. While the majority of the species are essentially xerophytic and occur on exposed rocky mountain slopes, these genera are more or less confined to swamps, or at any rate to places where water is present in the subsoil, and, as a consequence, exhibit the greatest luxuriance of growth in the Order. *Berzelia lanuginosa* is probably the tallest growing, while *Brunia nodiflora* varies in height according to soil and situation; both these species are infested by *Cuscuta africana* Thunb., while *Berzelia abrotanoides*, a common shrub, 2–3 ft. high, with reddish flower-heads, is rarely attacked by a scale insect. Several of the Pseudobæckeas are also marsh xerophytes.

The distribution of the Bruniaceæ is essentially coastal, as a reference to the accompanying table shows. They attain their greatest development in the south-western region of the Cape Colony, where, in the Caledon division, the group is represented by approximately twenty-five species, and in the adjoining Swellendam to the east by eighteen. As they spread eastwards (still hugging the coast) a rapid diminution of species is noticeable, until, in the Albany and Port Elizabeth divisions, they dwindle down to one species, and reappear farther up in Pondoland and Natal in *Raspalia trigyna*. On the Cape Peninsula ten species occur, and from there the diffusion of the group extends northwards, and centrally to the Oliphants River and the Cederbergen respectively.

It is well known that the distribution of many plant-groups is often coincident with a particular geological formation, and this is strikingly illustrated in the case of the Bruniaceæ, which appear to be more or less confined to the Table Mountain sandstone formation. Their disappearance in the vicinity of Port Elizabeth is a correlative to the disappearance of the particular geological formation in that region, for, as Rodgers* has stated, "The formation traverses more or less interruptedly the whole Colony from the Bokkeveld Mountains (Ceres division, where the Bruniaceæ are represented by ten species) to the Cape Peninsula, and thence to Port Elizabeth, where the formation enters the sea and with a wide curve reappears at the mouth of the St. John's River, and thence extends eastwards through Pondoland towards Natal."

Analogous cases are evident on the Cape Peninsula, for with the disappearance of the Table Mountain sandstone, as on Signal Hill, all traces of the Bruniaceæ vanish, and similarly the wide low-lying sandy expanses or flats which separate the Stellenbosch, Caledon, and Table Mountain ranges are destitute of members of this group, except for the ubiquitous *Staavia radiata* and an occasional *Berzelia.* Altitudinal range does not suffice to explain this distribution, as several species enjoy a fairly large range; thus *Berzelia lanuginosa* occurs at elevations from 300–3500 ft.; *B. abrotanoides*, 50–3500 ft.; *Staavia radiata*, 50–3500 ft.; *S. lateriflora*, 50–1500 ft.; *Brunia nodiflora*, 50–3000 ft.; *Pseudobæckea cordata*, 1–4000 ft., &c.

The paucity of the species in the centre of the Colony is in my opinion attributable to the absence of the geological formation under consideration, and, moreover, to the exceedingly cold nights and extremes of heat and cold which prevail, for, as Schimper rightly argues, it is the absolute maximum and minimum, not the mean annual temperature, which are of the greatest moment to the life of plants.

The absence of specialized structures for facilitating the dispersal of fruits or seeds has doubtless also contributed in preventing a wider diffusion of the order.

The extreme localization of certain species is worthy of note. *Staavia Dodii* is confined to a rocky ridge on the southern extremity of the Cape Peninsula, while *Audouinia capitata*, a subsocial though more abundant plant than the preceding, is restricted to the same area, and also on a similar geological formation on the other side of False Bay. *Mniothamnea callunoides*, a monotype, has only been discovered by the indefatigable Burchell on the Kampsche Berg, and on a mountain peak near Swellendam, and similarly *Berzelia Burchellii*, another of his discoveries, is only recorded from Garcias Pass, Caledon. *Staavia Brownii* has been detected on the Hottentot's Holland Range, while specimens of *Thamnea Massoniana*, collected by Masson in the vicinity of Stellenbosch, illustrate the circumscribed area of distribution of this species. The adjoined table is suggestive of the diffusion of the genera in general.

The Order is destitute of any economic properties, save that it yields occasional firewood, and affords material for the flower-vendors at the Cape. Formerly several of the species were cultivated in England and extensively on the Continent on account of

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* *An Introduction to the Geology of Cape Colony*, p. 106, 1904.

Table Illustrating the Approximate Distribution of the Bruniaceæ and showing their Preponderance in the Caledon Division and their Decrease Eastwards and Northwards.

N.W. ——*—— E.

Division	*Berzelia*	*Brunia*	*Nebelia*	*Raspalia*	*Pseudo-bæckea*	*Staavia*	*Mnio-thamnea*	*Thamnea*	*Titt-mannia*	*Audou-inia*	*Linconia*	*Loncho-stoma*	Aggre-gate
Clanwilliam ..	1			2	3			1					7
C. Ceres	2				2			2	3			1	10
Tulbagh......	2		1		1			3	1			1	9
Worcester	2	1	2	3	2	1						1	12
Paarl	2			1	2	2					1		8
Cape	2	1			1	6				1			11
Stellenbosch ..	1	2	2	2	1	2		2			1	1	14
Caledon	4	2	4	3	2	4		1		1	2	2	25
Bredasdorp ..					1	1						1	3
Swellendam ..	3	1			4	6	1	1	1		1		18
Riversdale....	2	2		1	1	1	1						8
George	2		2		1								5
Uniondale ..	1				1								2
Humansdorp..					1								1
C. G. Reinet	1												1
Uitenhage	2	1			2								5
Pt. Elizabeth	1												1
Albany	1												1
Pondoland ..				1									1
Natal				1									1

C. preceding the Division denotes Central; the others are Coastal.

their beauty, but with the exploitation of a different phase of horticulture these, in common with many Australian and Cape hard-wooded plants, suffered neglect. Among those which would, however, undoubtedly repay culture, are *Audouinia capitata*, *Brunia nodiflora*, and *B. Marlothii*, Berzelias and Nebelias in variety, *Staavia glutinosa* and *S. Dodii.*

The sequence of the genera as treated here is more or less in accord with the *Genera Plantarum* of Bentham & Hooker, but in the retention of *Nebelia* in preference to *Diberara* I have followed O. Kuntze, as it not only antedates the latter genus, but is moreover accompanied by a lucid description.

It is to be regretted that Sonder saw fit to unite *Raspalia* and *Berardia* (*Nebelia*), two exceedingly distinct genera, treated as such by all subsequent botanists.

Niedenzu, recognizing the unnatural conception of *Brunia* of certain writers, has divided it into two groups, *Pseudobœckea* and *Brunia* respectively, the Linnean acceptation of *Brunia* approaching *Berzelia* in character, while *Pseudobœckea*, comprising a rather heterogeneous group, exhibits a closer relationship to *Raspalia* or *Staavia.*

The specimens quoted, which have been seen and inspected by me are either at Kew or at the British Museum. Burchell's plants are all at Kew, while Drège's and the more recent collections of MacOwan, Bolus, Schlechter, and Wolley Dod are equally distributed. The specimens of Robert Brown, Bowie, and Masson are, with few exceptions, at the British Museum, but unfortunately they lack in the majority of cases information as regards locality.

Through the courtesy of Dr. Daydon Jackson, Secretary of the Linnean Society, I have been permitted to inspect the specimens of Linnæus, from which *B. ciliata* Linn., a most obscure species, is missing, nor does the herbarium of Thunberg contain it. Dr. O. Juel, of Upsala, has given me much information relating to Thunberg's plants; this has in most cases substantiated the synonymy of the group, and in a few instances necessitated revision. It is a pleasant duty to refer to the privileges which obtain at Kew and the British Museum, for which I desire to express my indebtedness.

BRUNIACEÆ

R. Brown in Clarke Abel's Narrative of Journey in the Interior of China, App. B. 374 (1816–1817). *Brongniart* in Ann. Sci. Nat. Paris, viii. 357–389 (1826).[*] *Endlicher*, Enchirid. 401–403 (1841). *Lindley*, Veg. Kingd. 785 (1846). *Sonder* in Harv. & Sond. Fl. Cap. ii. 309–324 (1861–62). *Baillon*, Adans. iii. 318–334 (1862–63), and Hist. Pl. iii. 384–389; 454–456 (1872). *Benth. & Hook.* Gen. Pl. i. 670–673 (1865). *Oliver* in Journ. Linn. Soc. Bot. ix. 331–333 (1867). *Niedenzu* in Engler u. Prantl, Pflanzenfamilien, iii. 2 A, 131–136 (1891). *Colozza* in Ann. Istit. Bot. di Roma, ii. 1–42 (1905). *Sim*, Forest Fl. Cape Colony, 220 (1907).

KEY TO GENERA.

*Corolla gamopetalous, tubular, with spreading limbs; stamens nearly subsessile, epipetalous... (12) *Lonchostoma.*
**Petals free or slightly cohering at the base; stamens free.
†Ovary 3-celled, each cell 2-ovulate.
Connective prolonged, bilobed. Inflorescence spiciform, flowers ericoid .... (11) *Audouinia.*
††Ovary 2-celled, each cell 2–4-ovulate.
Anthers linear or oblong.
Connective not prolonged. Flowers solitary, terminal or axillary.
Receptacle shortly obconic, not verrucose. Nut eventually crowed by the annular disc and style .... (5) *Thamnea.*
Receptacle globose or turbinate, verrucose. Nut crowned by the remains of calyx and corolla (4) *Tittmannia.*
Anthers cordate or sagittate, their lower halves usually free and often divergent.
Fruit indehiscent.
Stamens exserted, anthers versatile; styles filiform .... (2) *Brunia.*
Stamens not exserted; anthers dorsified; styles stout, short .... (8) *Pseudobœckea.*
Fruit dehiscent.
Inflorescence capitate (very rarely spiciform); flowers not scarious; petals clawless. Connective not prolonged.
Styles two; ovary half-inferior.
Bracts scarious, pale flesh or straw-coloured; stamens always exserted .... (3) *Nebelia.*
Bracts leafy or absent; stamens very rarely exserted .... (7) *Raspalia.*
Style one, deeply and longitudinally grooved. Petals epigynous.............................. (9) *Staavia.*
Inflorescence spicate, flowers scarious; petals unguiculate. Connective prolonged (10) *Linconia.*
†††Ovary 1-celled, 1-ovulate; style one.
Stamens exserted. Flowers congested in ovoid or globose nude heads....................................... (1) *Berzelia.*
Stamens not exserted. Flowers solitary, axillary or terminal, inconspicuous..................... (6) *Mniothamnea.*

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[*] Sonder quotes a reprint of this treatise in the Flora, differently paged.

I. BERZELIA

Brongn. *op. cit.* 370; Sonder, *op. cit.* 310; Hooker, *op. cit.* 671; Niedenzu, *op. cit.* 136; Colozza in Ann. Istit. Bot. di Roma, ii. 13–18 (1905). *Brunia* of various authors. *Rabenhorstia* Reichb. Nom. 159 (1841).

KEY TO SPECIES.

- *Flower-heads racemosely-disposed.
  - Leaves 1 cm. or over .... (6) *squarrosa.*
  - Leaves 3–5 mm.
    - Leaves broadly subulate .... (1) *commutata.*
    - Leaves filiform .... (3) *lanuginosa.*
- **Flower-heads corymbosely-disposed.
  - Leaves 4 mm. broad, cordate; flower-heads pale sulphur-yellow .... (7) *cordifolia.*
  - Leaves ½–2 mm. broad, subulate, ovate or lanceolate; flower-heads orange-red.
  - Leaves subulate, acute; flower-heads invariably obovoid or ellipsoid.
    - Leaves glabrous at maturity, light green .... (2) *intermedia.*
    - Leaves downy, conspicuously ashy-grey .... (5) *Burchellii.*
  - Leaves ovate to ovate-lanceolate, obtuse.
    - Flower-heads globose .... (4) *abrotanoides.*

1. B. COMMUTATA Sonder, *l. c.*; Colozza, *op. cit.* pp. 13, 39. *B. comosa* Ecklon & Zeyher, Enum. Pl. 137.

COAST REGION. — Uitenhage Div.: In the channel of the Zwartkops River, *Ecklon & Zeyher*, 1051! Uitenhage, *Zeyher*, 734! between Bethelsdorp and Uitenhage, *Burchell*, 4402! slopes of the Vanstaadensbergen, *MacOwan*! Fort Beaufort Div.: Fort Beaufort, *Zeyher*, 5! Port Elizabeth Div.: Port Elizabeth, *Ethel West*, 33! CENTRAL REGION.—Graaff Reinet Div.; Near Blaauw Krantz, in a woody ravine, *Burchell*, 3703!

WITHOUT LOCALITY.—*Reeves*! *Zeyher*, 2644!

2. B. INTERMEDIA Schlechtendal in Linnæa, vi. 188; Ecklon & Zeyher, *l. c.*; Sonder, *op. cit.* 311; Colozza, *op. cit.* pp. 13, 40. *B. intermedia* forma *gracilis* Colozza, *l. c.* *B. Wendlandiana* Ecklon & Zeyher, *op. cit.* 137. *B. ericoides* Ecklon & Zeyher, *l. c.* *Brunia paleacea* Wendl. Coll. t. 21 (not Berg or Willd.). *B. ericoides* Wendl. Coll. t. 57. *B. intermedia* D. Dietr. Syn. Pl. i. 848.

COAST REGION.—Riversdale Div.: Great Valsch River, *Burchell*, 6558! George Div.: Lange Kloof, *Ecklon & Zeyher*, 1052. Georgetown, *Pappe*! *Bowie*, 10! Uniondale Div.: Kammanassie Mountains, near Avonhuur, *Bolus*, 1573! Swellendam Div.: Puspas Valley, *Ecklon & Zeyher*, 1052! Duyvelsbosch, near Swellendam, *Ecklon & Zeyher*, 1053. Uitenhage Div.: Vanstaadensriver Mountains, *Ecklon & Zeyher*, 1054! near Galgebosch, *Burchell*, 4691! Albany Div.: On mountains near Howison's Poort, 1800 ft., *MacOwan*, 851!

WITHOUT LOCALITY.—*Thom*, 175, partly!

Var. ALOPECUROIDEA Dümmer, nom. nov. *B. intermedia* v. *b*, Sonder, *l. c.* *Brunia alopecuroidea*, Ecklon & Zeyher, *op. cit.* 139 (not Thunb.).

COAST REGION.—Caledon Div.: Hottentot's Holland Mountains, near Palmiet River, *Ecklon & Zeyher*, 1067. Houw Hoek, *Bowie* in *Herb. Brit. Mus.*!

A specimen in the Kew Herbarium without information as to locality or collector.

3. B. LANUGINOSA Brongn. *op. cit.* 372, t. 31, f. 1; Schlecht. *op. cit.* 188; Sonder, *l. c.*; Colozza, *op. cit.* pp. 13, 39. *B. lanuginosa* var. *longifolia* Sonder, *op. cit.* 311. *Brunia lanuginosa* Linn. Sp. Pl. 199; Berg, Cap. 60; DC. Prod. ii. 44; Wend. Coll. t. 11; Lodd. Bot. Cab. t. 572. *B. superba* Don, Hort. Cant. 27 (1800); Willd. Sp. i. 1143.

COAST REGION.—Cape Div.: Simonsbay, *Milne*, 31! Table Mountain and about Cape Town, *Pappe*! *MacGillivray*, 642! *Ecklon*, 140 *b*! *Milne*, 31! *Ecklon & Zeyher*, 1050! *Burchell*, 26! *Dümmer*, 162! Wynberg, *Harvey*! Steenberg, *Wolley Dod*, 2733! Muizenberg, 1300 ft., *Schlechter*, 1281! Paarl Div.: Near Paarl, *Drège*, *a*! *Drège*, *b*! Caledon Div.: Palmiet River, 800 ft., *Bolus*, 2611! between Palmiet River and Sir Lowry's Pass, *Burchell*, 8175! at Sir Lowry's Pass, *Burchell*, 8259! Krom River, *Drège*, 6861 *b*. Swellendam Div.: Summit of a mountain peak near Swellendam, *Burchell, Herb. Kew*, 7413!

WITHOUT LOCALITY.—*Sieber*, 56! *Thom*, 672! 500! 998! *Thom*, 175, partly! *Bowie*, 9! *Forster*! *Roxburgh*! *Reeves*! *Bunbury*! *Harvey*, 253! *Pappe*! In *Herb. Linnæus*! *Gay*! *Moore*! *Cliffort*! *Collinson*! *Forsyth*!

Var. TENUIFOLIA Zahlb. in Ann. Hofm. Wien, xx. 13 (1905). *B. lanuginosa* var. *glabra* Sonder *l. c.* *B. lanuginosa* E. Meyer, *op. cit.* 168 (in part); Ecklon & Zeyher, *l. c.* (in part). *B. Dregeana* Colozza in Nuov. Giorn. Bot. Ital. x. 396 (1903); *op. cit.* pp. 15, 39, t. iii. *B. tenuifolia* Willd. in Denkschr. Acad. Muench. 129, t. 5, f. 2 (1808); Schnizl, Icon. iii. t. 168, f. 1.

COAST REGION. — Clanwilliam Div.: Pakhuisberg, 2500 ft., *Schlechter*, 8606! Cape Div.: Table Mountain, *Pappe*! *Ecklon & Zeyher*, 1050! Paarl Div.: Paarl Berg, 1000–2000 ft., *Drège*, 6857 *a*! *Drège*, *c*! Worcester Div.: Dutoit's Kloof, 1000–2000 ft., *Drège*, *b*!

WITHOUT LOCALITY.—*Auge*! *Zeyher*, 481!

The flower-heads of *B. lanuginosa* are invariably racemosely and not paniculately-disposed. Except in the more radially spreading leaves, I can discern no differences between *B. Dregeana* Colozza and the variety of the former species.

4. B. ABROTANOIDES Brongn. *l. c.* 371; Schlecht. *op. cit.* 188; Ecklon & Zeyher, Enum. 138; Sonder, *op. cit.* 311; Colozza, *op. cit.* pp. 14 and 40. *Brunia abrotanoides* Linn. Sp. Pl. 199; Berg. Cap. 59; Thunb. Prod. 41; Willd. i. 1143; DC. Prod. ii. 44. *B. abrotanifolia* F. G. Dietr. Vollst. Lex. Gaert. ii. 320 (1802).

COAST REGION.—Cape Div.: Cape Flats, near Rondebosch, *Burchell*, 211! 717! *Dümmer*, 445! In sandy places near Constantia, 200–600 ft., *Zeyher*, 3! Hout Bay, *Harvey*, 210! Wynberg, *Pappe*! Table Mountain, *Bowie*, 5! Camp Ground, *Wolley Dod*, 2204! Stellenbosch Div.: between Sir Lowry's Pass and Jonker's Hoek, *Burchell*, 8317! Simonsberg, *Wallich*! George Div.: Kokman's Kloof, *Zeyher*, 2! Mountains of George, *Bowie*, 4!

WITHOUT LOCALITY.—*Roxburgh*! *Harvey*, 59! 251! 591! *Thom*, 972! *Sieber*, 57! 794! 767! *Wallich*! *Zeyher*! *Desmaret*! in *Herb. Linnæus*!

Var. GLABRA Sonder, *l. c.*

COAST REGION.—Cape Div.: Cape Flats, near Claremont, *Schlechter*, 428! Near Princess Vley, *MacOwan*, 1610! Paarl Div.: French Hoek, sandy places below 1000 ft., *Drège*, 6863! CENTRAL REGION.—Ceres Div.: Villiersdorp, 1500 ft., *Schlechter*, 9365! Locality doubtful, *Thom*, 14!

Var. PILOSA Sonder, *l. c.* *Berzelia brevifolia* Ecklon & Zeyher, Enum. Pl. 138. *Brunia brevifolia* D. Dietr. Syn. Pl. i. 848.

COAST REGION.—Tulbagh Div.: on mountains near Tulbagh, *Ecklon & Zeyher*, 1058. Stellenbosch Div.: at the foot of the Simonsberg, below 500 ft., *Drège*, 6864! in *Herb. Forsyth*!

Var. REFLEXA Sonder, *l. c.* *Brunia squarrosa* Swartz ex Harvey & Sonder, Fl. Cap. *l. c.*

COAST REGION.—Paarl Div.: in sandy places, French Hoek, below 1000 ft., *Drège* in *Herb. Kew*, 6863 *a*!

WITHOUT LOCALITY.—*Forster* in *Herb. Kew*! *Bunbury* in *Brit. Mus.*, 248!

Var. PARVIFOLIA Sonder, *l. c.* *Berzelia abrotanoides* v. *crassifolia* Colozza in Nuov. Giorn. Bot. Ital. x. 397 (1903); *op. cit.* pp. 14, 40, t. iv. *Brunia deusta* Thunb. Diss. de Brun. 4; Fl. Cap. 205 (not Willd.).

COAST REGION.—Cape Div.: Simonsbay, margin of a stream, *MacGillivray* in *Herb. Kew*, 641! *Milne*, 33! Paarl Div.: French Hoek, *Drège*, 6863 *b*!

Var. LANCEOLATA Sonder, *l. c.* *B. formosa* Eckl. & Zeyh. Enum. Pl. 138. *Brunia abrotanoides* Wend. Coll. t. 45 (not Linn.). *B. formosa* D. Dietr. Syn. i. 848.

COAST REGION.—Cape Div.: above Constantia, *Ecklon & Zeyher*, 1060.

Var. TETRAMERA Dümmer, nom. nov. *Berzelia abrotanoides* v. *a*, Brongn. *op. cit.* 371.

Flowers tetramerous.

WITHOUT LOCALITY.—*Herb. Burmann* and *Mus. Paris.*

5. **B. Burchellii** Dümmer, sp. nov. *Fruticulus* 0·6 m. altus, ramis subverticillatis ascendentibus cylindricis pilosis superne cinerascentibus dense foliatis medio laxius foliatis basi plerumque

nudis, cortice castaneo obtectis; ramulorum florentium folia paullo breviora. *Folia* patentia, apicem versus sensim incurvata, petiolo brevi adpresse pilosulo castaneo suffulta; lamina triquetra vel anguste semiteretia, obtusa, nigro-apiculata, 2–4 mm. longa, utrinque cinereo-pilosula. *Capitula* obovoidea, vix globosa, circ. 8–10 mm. diametro, breviter stipitata in corymbos terminales disposita. *Calycis* segmenta subulata, vix 1 mm. alta, superne pilosa. *Petala* quam calyce duplo longiora, anguste spatulata vel lineari oblonga, apice rotundata, omnino glabra, sicco primo flavida sed demum rubescentes. *Stamina* exserta, glaberrima, filamentis complanatis rubescentibus, antheris pallide sulphureis. *Stylus* simplex, filiformis, corollæ subæqualis ut in ovario fere glabra.

Coast Region. — Riversdale Div.: about the waterfall and at Garcias Pass, *Burchell*, 6971, 7030, 7029 in *Herb. Kew*!

Most closely allied to *B. abrotanoides* Brongn., but differing markedly from that species in the densely leafy, ashy-grey cylindrical upper twigs, the patently spreading, slightly incurved, triquetrous or semiterete pilose leaves, smaller obovoid flower-heads, and correspondingly smaller flowers.

6. B. squarrosa Sonder, *op. cit.* 312. Var. *glabra* Sonder, *l. c.* *B. arachnoidea* Eckl. & Zeyh. *l. c.*; Colozza, *op. cit.* pp. 15 and 40. *B. superba* Eckl. & Zeyh. *l. c.*; Colozza, *op. cit.* pp. 16 and 41. *Brunia arachnoidea* Wendl. Coll. ii. t. 62; Roem. & Schult. v. 413. *B. ericoides* Wendl. Coll. ii. t. 57. *B. superba* Reichb. Hort. Bot. t. 100, excl. analyses.

Coast Region.—Tulbagh Div.: Witzenberg Range, *Pappe*! near Tulbagh, *Burchell*, 8707! above the Tulbagh Waterfall, *Ecklon & Zeyher*, 1056; Tulbagh, 2000 ft., *Schlechter*, 7478! Caledon Div.: at Palmiet River and Houw Hoek, 1000–2000 ft., *Drège*, 6862 *b*! Central Region.—Ceres Div.: Cold Bokkeveld, 4000 ft., *Schlechter*, 8926! Warm Bokkeveld, 1800 ft.; near Ceres, *Bolus*, 2611!

Schlechter's and Bolus's specimens are rather slender, but doubtless they belong here.

Var. reflexa Sonder, *l. c.* *Berzelia rubra* Schlt. in Linnæa, vi. 189; Ecklon & Zeyher, *op. cit.* 138. *B. squarrosa* Colozza, *op. cit.* pp. 16 and 40. *Brunia squarrosa* Thunb. Diss. de Brun. 5; Fl. Cap. 44; DC. Prod. ii. 44; Spreng. Syst. 782. *B. rubra* Willd. Denkschr. Acad. Muench. t. 4, f. 1 (1808).

Coast Region.—Worcester Div.: Dutoit's Kloof, 1000–2000 ft., *Drège*, 6862 *a*! *Drège*, 6862 *c*! Caledon Div.: tops of the mountains near Baviaan's Kloof, near Genadendal, *Burchell*, 7768! Vogelgat, 3500 ft., *Schlechter*, 9561!

7. B. cordifolia Schlechtendal in Linnæa, vi. 189; Eckl. & Zeyh. Enum. *l. c.*; Sonder, *op. cit.* 312. *Brunia cordifolia* D. Dietr. Syn. Pl. i. 848 (1839).

Coast Region. — Swellendam Div.: near Mount Potberg, 100–500 ft., *Ecklon & Zeyher*, 1061, *Zeyher*, *Herb. Kew*!

Without Locality.—*Lehman*, *Herb. Kew*!

II. BRUNIA

Linn. Syst. ed. 1, 1375; Bergius, Pl. Cap. 54; Thunb. Prod. 41; Willd. Sp. Pl. i. 1141; Brongn. *l. c.* 373; Sonder, *op. cit.* 313 (in part); Hooker, *op. cit.* 671 (in part); Niedenzu, *op. cit.* 136.

Key to Species.

† Bracts incurved, exceeding the flowers. Leaves ashy grey, downy, approx. 1 cm. long.
  Flower-head oblong, $2\frac{3}{4}$ cm. across .... (3) *Marlothii.*
  Flower-head ovoid, 3–$4\frac{1}{2}$ cm. across........... (4) *macrocephala.*
†† Bracts hidden. Leaves greenish, 2–5 mm. long.
  * Flower-heads solitary and terminally disposed, globose, about 1 cm. in diameter, orange-red.
    Leaves trigonous, keeled dorsally and dilated at the base .... (1) *nodiflora.*
    Leaves linear, convex dorsally and contracted at the base......................... (2) *lævis.*
  ** Flower-heads racemosely-disposed, ellipsoid, 4–5 mm. long, pale yellow, leaves glabrous, broadly subulate, 3–4 mm. long........... (5) *alopecuroides.*

1. B. NODIFLORA Linn. Sp. Pl. 199; Bergius, *l. c.*; Thunb. *l. c.*; Willd. *l. c.*; Roem. & Schult. Syst. Veg. v. 409; Brongn. *l. c.* t. 36, f. 1; Wendland, Coll. Pl. t. 35; Sonder, *l. c.*; Niedenzu, *l. c.* 132, f. 74, A–G. *B. nodiflora* Colozza in Ann. Istit. Bot. di Roma, ii. pp. 18 and 37, 1905. *B. nodiflora* L. var. *tulbaghica*, *swellendamensis*, and *uitenhagensis* Ecklon & Zeyher, Enum. Pl. 139.

Coast Region.—Cape Div.: Table Mountain and Devil's Peak, *Bowie*! *Pappe*! *Wilms*, 3199*d*! *Ecklon & Zeyher*, 1062! below 1000 ft., *Drège*, *a*! *Ecklon*, 103! *Wolley Dod*, 2640! Stinkwater, *Rehmann*, 1238! *Dümmer*, 1284! Wynberg, *Burchell*, 860! Campsbay, 401! Constantiaberg, *Schlechter*, 874! Cape Flats, *Rehmann*, 2022! near Cape Town, *Harvey*! Stellenbosch Div.: near Stellenbosch, *Ecklon & Zeyher*, 1062! Worcester Div.: Worcester, *Cooper*, 1591! Tulbagh Div.: Witzenberg Range, near Tulbagh, *Burchell*, 8693! 8727! Tulbagh, *Ecklon & Zeyher*, 1062! Caledon Div.: Caledon, *Pappe*! *Ecklon & Zeyher*, 1062! Houw Hoek, 3000 ft., *Schlechter*, 7582! Tops of the mountains of Baviaan's Kloof, near Genadendal, *Burchell*, 7684! Uitenhage Div.: On the Vanstaadensberg nearest to Galgebosch, *Burchell*, 4689! Uitenhage, *Harvey*! *Ecklon & Zeyher*, 1062.

Without Locality.—*Sieber*! *Thom*, 563! *Reeves*! *Forster*! *Zeyher*, 1440! *Masson*! *Maton*! *Tredgold*! *Oldenburg*, 381! 478! in *Herb. Linnæus*! *Forsyth*!

2. B. LÆVIS Thunb. Prod. 187; Diss de Brun. 3-4; Roem. & Schult. *l. c.*; Sonder, *op. cit.* 313. *B. superba* Krauss ex Fl. Cap. 314 (not Don). *B. globosa* E. Meyer in Drège, Zwei Pfl. Doc. 169 (not Thunb.); Ecklon & Zeyher, *op. cit.* 139. *B. neglecta* Schlechter in Engl. Jahrb. xxiv. 443 (1897–98).

Coast Region.—Stellenbosch Div.: Mountains of Sir Lowry's

Pass, *Burchell*, 8193! Caledon Div.: Houw Hoek, 1500 ft., *Schlechter*, 7297! 7331! between Nieuwe Kloof and Elands Kloof, 1000–2000 ft., *Drège*, 6854*a*! Attaquas Kloof, 1000–2000 ft., *Drège*, 6854*c*! on stony slopes, Baviaansberg, near Genadendal and the Zwartberg, *Ecklon & Zeyher*, 1063! Riversdale Div.: Between Little Vet River and Garcias Pass, *Burchell*, 6863! Swellendam Div.: Cape George and Swellendam, *Bowie*!

WITHOUT LOCALITY.—*Thom*, 603!

3. B. MARLOTHII Schlechter in Journal of Botany, 1897, 280.

COAST REGION.—Worcester Div.: On the Matroosberg, 3500 ft., *Bolus*, Herb. Kew, 6364! Matroosberg, 4500 ft., *Marloth*, 2012, 2353.

A distinct species, with solitary terminal ovoid or oblong flower-heads, nearly 2·5 cm. in diameter, with subimbricate, slightly incurved, greyish pilose leaves, differing mainly from the following in the smaller flower-heads, fewer and less conspicuous incurved bracts.

4. B. MACROCEPHALA Willd. in Denkschr Acad. Muench. i. 132, t. 5, f. 1 (1808) (not E. Meyer); Sonder in Fl. Cap. ii. 314.

COAST REGION.—Worcester Div.: Hex River, *Masson*, *Mus. Brit.*!

WITHOUT LOCALITY. — In *Herb. Willdenow*; *Niven*, *Herb. Sonder*. A specimen probably collected by Wallich in the British Museum!

5. B. ALOPECUROIDES Thunb. Prod. 187; Diss. de Brun. 6; Brongniart, *op. cit.* 375. *Berzelia alopecuroides* Sonder, *op. cit.* 310.

WITHOUT LOCALITY.—*Thunberg*; *Thom* in *Herb. Kew*, 695! *Roxburgh & Brown* in *Herb. Brit. Mus.*!

Imperfectly Known Species.

Brunia capitata Desf. Tabl. Hort. Par. ed. ii. 232 (1815).
B. candicans Hort. ex Steud. Nom. ed. ii. i. 231.
B. ciliata Linn. Sp. Pl. 199 (1753).
B. elegans Dum. Cours. Bot. Cult. iii. 616 (1802).
B. flagelliformis Hort. ex Steud. Nom. i. 231 (1840).
B. formosa Dum. Cours. *op. cit.* 616.
*B. glabrata** Thunb. in Hoffm. Phytog. Bl. i. 18 (1803).
*B. hirsuta** „ „ „ „ 19 „
B. imbricata Wend. f. ex Hoffm. Verz. Pfl. Nachtr. i. 228 (1826).
B. plumosa Lam. Encyl. Meth. i. 475 (1783).
B. sericea Hort. ex Dum. Cours. Bot. Cult. vii. 329 (1814).
B. speciosa „ „ „ vi. 279 (1811).

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* According to Dr. O. Juel, of Upsala, specimens of these species are not in the Thunberg herbarium.

III. NEBELIA

Neck. Elem. i. 113 (1790); O. Kuntze, Rev. Gen. Pl. 233 (1891) (in part). *Berardia* Brongn. *op. cit.* 380; Hooker, *op. cit.* 672; Sonder, *op. cit.* 318 (in part). *Diberara* Baillon in Bull. Soc. Bot. Linn. Par. i. 279 (1881); Niedenzu, *op. cit.* 135. *Heterodon* Meissner, Gen. 72 (1837)?

KEY TO SPECIES.

*Flower-heads broadly obconic.
  Interspersed bracts exceeding the flowers .... (2) *lævis.*
  Interspersed bracts scarcely exceeding the flowers... (1) *paleacea*
**Flower-heads globose or ovoid.
  †Leaves glabrous, 2–3 mm. long; flower-heads ovoid, 7–8 mm. long .... (4) *tulbaghensis.*
  ††Leaves hairy, 4–6 mm. long.
    a. Interspersed bracts much longer than the flowers.
      Flower-heads globose, 12–13 mm. in diameter; leaves 6 mm. long .... (5) *fragarioides.*
      Flower-heads globose, 18–25 mm. in diameter; leaves 4 mm. long .... (6) *globosa.*
    b. Interspersed bracts scarcely exceeding the flowers.
      Flower-heads broadly ovoid, 2 cm. in diameter (3) *sphærocephala.*

1. NEBELIA PALEACEA Sweet, Hort. Brit. 116 (1830). *Berardia paleacea* Brongn. *op. cit.* 381, t. 37, f. 2; Sonder, *op. cit.* 319. *Brunia paleacea* Berg. Cap. 56; Linn. Mant. 559; Thunb. Prod. 41; Fl. Cap. 206; Willd. *l. c.* t. 3, f. 1. *B. Thunbergiana* D. Dietr. Syn. Pl. i. 849. *Diberara paleacea* Niedenzu, *op. cit.* 136; Colozza, *op. cit.* pp. 21, 33.

COAST REGION. — Stellenbosch Div.: Hottentot's Holland Mountains, *Pappe*! Sir Lowry's Pass, 1000 ft., *Bolus*, 4179! *MacOwan*, 1458! Stellenbosch, *Harvey*! Worcester Div.: Dutoit's Kloof, 2000–4000 ft., *Drège, a*! and *Drège, a a*! Caledon Div.: On hills near Grabouw, Palmiet River, 900 ft., *Bolus*, 4179! *Ecklon & Zeyher*, 1080! tops of mountains near Baviaan's Kloof, near Genadendal, *Burchell*, 7680! Zwartberg, *Pappe*! slopes of mountains near Houw Hoek, *Bowie*! *MacOwan, Herb. Norm. Austr.-Afric.* 137! Villiersdorp, 1500 ft., *Schlechter*, 9919! George Div.: Mountains of George, *Bowie*!

WITHOUT LOCALITY.—*Thom*, 702! *Masson*! *Zeyher*, 2649! *Oldenburg*, 1264! *Harvey*! in *Herb. Forsyth*!

The size of the flower-heads varies; specimens collected by *Bolus*, 4179, at Sir Lowry's Pass, and *Bowie* at Houw Hoek, scarcely exceed 7 mm. in diameter, while the majority of specimens at Kew, collected in the vicinity of the locality cited and elsewhere, have flower-heads averaging 12 mm. across.

2. N. LÆVIS O. Kuntze, Rev. Gen. 233 (1891). *Berardia lævis* E. Meyer in Drège, Zwei Pfl. Doc. 168; Sonder, *op. cit.* 319. *Diberara lævis* Niedenzu, *l. c.*, f. 75, q.

COAST REGION. — Caledon Div.: Rocky and stony mountain places, 3000–4000 ft.; Genadendal, *Drège*! tops of mountains near

Baviaan's Kloof, Genadendal, *Burchell*, 7675! on a mountain near Genadendal, *Bolus*, 7386! 4000 ft., *Schlechter*, 9813!

3. N. SPHÆROCEPHALA O. Kuntze, *l. c.* *Berardia sphærocephala* Sonder, *op. cit.* 319. *Brunia macrocephala* E. Meyer, *op. cit.* 169 (not Willd.). *B. microcephala* Sonder, *l. c.* in syn. *Diberara macrocephala* Nied. *op. cit.* 136.

COAST REGION.—Worcester Div.: Dutoit's Kloof, 3000–4000 ft., *Drège* in *Herb. Kew*!

4. N. TULBAGHENSIS Dümmer, sp. nov.

A densely branched subshrub, with fastigiate, filiform, leafy, subglabrous twigs. Leaves erect, subimbricate, slightly incurved, narrowly lanceolate or oblong, triquetrous, obtuse, with a black apiculus, 2–3 mm. long, dorsally keeled, glabrous except for a few scattered hairs at the base and along the margins. Flower-heads terminal, solitary, shortly stipitate, ovoid or subglobose, rarely exceeding 6 mm. in diameter, without a common involucre, the interspersed scales as long as the flowers, narrowly ovate, cuspidate, sparingly ciliate towards the base, entire, flesh-coloured. Calyx-segments narrowly oblong, sparingly pilose, the glabrous petals slightly exceeding them. Styles filiform, divergent, glabrous.

COAST REGION. — Tulbagh Div.: Nieuwe Kloof, 3000 ft., *Schlechter* in *Herb. Brit. Mus.* and *Kew*, 7500! (as *Berardia*).

The small, compact, ovoid, or subglobose inflorescences characterize this species, and distinguish it immediately from any of its allies.

5. N. FRAGARIOIDES O. Kuntze, Rev. Gen. 233 (1891). *N. affinis* Sweet, Hort. Brit. 116 (1830). *Berardia affinis* Brongn. *op. cit.* 381; Sonder, *op. cit.* p. 319, not 320. *B. fragarioides* Schlecht. in Linnæa, vi. 190 (1831); Eckl. & Zeyh. Enum. Pl. p. 141. *Heterodon fragarioides* Meissn. Gen. Comm. 52 (1837). *Brunia fragarioides* Willd. *l. c.* 128; Sp. Pl. i. 1143; Spreng. Syst. i. 782. *B. fragarioides* DC. Prod. ii. 455. *Diberara affinis* Niedenzu, *l. c.* *D. fragarioides* Colozza, *op. cit.* 21. *Linconia capitata* Banks ex Brongn. *l. c.*

COAST REGION. — Caledon Div.: Hottentot's Holland Mountains, near Palmiet River, *Ecklon & Zeyher*, 1081! Houw Hoek, *Roxburgh*, partly!

WITHOUT LOCALITY.—*Masson* in *Herb. Brit. Mus.*

6. N. GLOBOSA Dümmer, comb. nov. *Berardia globosa* Sond. Fl· Cap. ii. 320. *Brunia globosa* Thunb. Diss. de Brun. 4; Fl. Cap. ii. 90; Roem. & Schult. Syst. Veg. v. 409: DC. Prod. ii. 43. *Berzelia? globosa* Don. Gen. Syst. ii. 46. *Heterodon superbus* Meiss. Gen. Comm. 52 (1837)? *Diberara globosa* Nied. *l. c.*

COAST REGION.—Stellenbosch Div.: Sir Lowry's Pass, 3500 ft., *Schlechter*, 7228! Caledon Div.: Houw Hoek, *Niven*, *Herb. Brit. Mus.*, partly!

Having compared Ecklon & Zeyher's *B. fragarioides*, 1081, with the type specimen of *B. affinis* Brongniart, I have no hesitation in uniting them, and retaining *B. globosa* of Sonder as a distinct species, which differs from the preceding in its more copiously branching habit, shorter, less pilose leaves, and larger flower-heads, which average 2 cm. in diameter. In the Flora the segments of the calyx of *B. affinis* are stated to be shorter than the petals, but the reverse is the case. Don infers that the flowers of *N. globosa* are white, but this is erroneous. I am indebted to Dr. O. Juel, of Upsala, for a photograph of Thunberg's specimen of *Brunia globosa*, which leaves no doubt as to the identity of this plant.

IV. TITTMANNIA.

Brongn. in Ann. Sci. Nat. viii. 385 (1826); Sonder, *op. cit.* 312; Hooker, *op. cit.* 671; Niedenzu, *op. cit.* 134. *Moesslera* Reichb. in Moess. Handb. ii. i. p. 1 (1827); Consp. 160 (1828). *Thamnea* Baill. Hist. Nat. iii. 388 (1872).

KEY TO SPECIES.

* Leaves scabrid, ciliolate.
  Leaves linear with an incurved obtuse apex, 3–4 mm. long .... (1) *laxa.*
  Leaves narrowly deltoid with a spreading subacute apex, 1–1½ mm. long .... (3) *pruinosa.*
** Leaves smooth, not ciliolate; narrowly deltoid, 1½–2 mm. long .... (2) *Oliveri.*

1. T. LAXA Presl. Bot. Bemerk. 39; Sonder, *op. cit.* 313; Niedenzu, *l. c.*; Colozza, *op. cit.* pp. 26, 38. *T. lateriflora* Brongn. *op. cit.* 386, t. 38, f. 2. *Thamnea laxa* Baillon, *l. c.* *Brunia laxa* Thunb. Prod. 187 (1800); E. Meyer in Drège, Zwei Pfl. Doc. 169. *Moesslera lateriflora* Eckl. & Zeyher, Enum. Pl. 142.

COAST REGION.—Tulbagh Div.: Near the waterfall, Tulbagh, *Ecklon & Zeyher*, 1086! Nieuwe Kloof, in stony places, 2000–3000 ft., *Drège, b*! between Nieuwe Kloof and Elands Kloof, 1000–2000 ft., *Drège, b b*! Tulbagh, *Pappe*! Robertson Div.: Kokmans Kloof, *Ecklon & Zeyher*, 1086! Swellendam Div.: Swellendam, *Zeyher*. CENTRAL REGION.—Ceres Div.: Koude Bokkeveld, Wagenbooms River, 6000 ft., *Schlechter*, 10,154! Mosterts Berg, near Ceres, 3000 ft., *Schlechter*, 257!

WITHOUT LOCALITY.—*Zeyher* ?, 34! *Niven*! *Herb. Forsyth*!

2. **T. Oliveri** Dümmer, sp. nov. *Frutex* ramosissimus, circiter 30 cm. altus, ramis rigidiusculis haud flexuosis, junioribus brevibus valde foliatis puberulo-scabriusculis brunneis. *Folia* adscendentia, vix adpressa, imbricata, lineari-lanceolata, obtusiuscula vel sæpe apice puncto nigro notata, 1–1·7 mm. longa, carnosula, trigona, dorso convexo-carinata, haud scabriuscula sed levis, margine integra vel interdum erratico-denticulata. *Flores* solitarii in axillis foliorum summorum racemosim dispositi foliis vix duplo longiores, albidi, pedicellati, pedicellis circiter 0·5 mm. longis puberulo-scabriusculis brunneis; involucrum, e foliis 8–10 imbricatis parvis, anguste ovatis subscariosis, costata ciliolatis, constitutum receptaculum fere obtegens. *Receptaculum* ellipsoideo-

globosum, verrucosum, glabrum, longitudinaliter sulcatum, brunneum. Segmenta calycina receptaculo longiora, erecta, rigida, lanceolata, quam corolla breviora. *Petala* obovato-lanceolata vel elliptica, obtusa vel rotundata, basi in unguem angustata. *Stamina* inclusa. *Stylus* crassus, perbrevis.

Central Region.—Ceres Div.: Cold Bokkeveld, 4500 ft., *Schlechter*, 8874!

A species allied to the preceding, but differing in the more intricately-branched habit, shorter, scarcely flexuose twigs, spreading or ascending, rarely adpressed, shorter and smooth, not scaberulous leaves, and brownish receptacles.

Prof. D. Oliver's annotations and MS. notes relating to various species of the Order have been of considerable interest and value in the elucidation of the more critical species.

3. **T. pruinosa** Dümmer, sp. nov. affinis *T. Oliveri*, Dümmer, sed foliis brevioribus pruinoso-scabriusculis haud levibus, floribus minoribus brevius pedicellatis, foliis involucralibus paucioribus late deltoideis, calycis segmentis receptaculo atropurpureo subæquilongis, distinguenda.

A densely branched shrublet, about 0·4 met. high, with short rigid leafy scaberulous twigs; leaves ascending or spreading, rarely appressed, imbricate, linear lanceolate, obtuse or tipped by a black mucro, trigonous, dorsally convexly keeled, scarcely exceeding 1 mm. in length, distinctly scaberulous, margin ciliolately denticulate. Flowers whitish, scattered, solitary in the axils of the upper leaves and exceeding them. Involucral bracts 5–6, imbricate, broadly ovate, investing the lower half of the globose verrucose, dark purple receptacle. Calyx-segments erect, scarious, broadly deltoid, as long as the receptacle. Petals, stamens and style as in the preceding species.

Central Region.—Ceres Div.: Stony slopes of the Skurfdebergen, near Gydouw, 4500 ft., *Bodkin*, *Herb. Norm. Aust. Afr.* 1153!

V. THAMNEA

Solander ex R. Brown, Pl. Abel. 3 (1818); Brongn. *op. cit.* 386; Sonder, *op. cit.* 324; Hooker, *op. cit.* 671; Oliver in Journ. Linn. Soc. Bot. ix. 331 (1867); Niedenzu, *op. cit.* 134. *Schinzafra* O. Kuntze, Rev. Gen. Pl. i. 234 (1891).

Key to Species.

- * Flowers white, small, 2–4 mm. long.
    - † Style scarcely half as long as the petals; stigma capitate; leaves convex-carinate ...... (3) *thesioides.*
    - †† Style nearly as long or exceeding the petals; stigma simple; leaves sharply carinate.
        - 4 ovules to each loculus.
            - Shrubby, erect; twigs glabrous; leaves entire .... (1) *uniflora.*
            - Prostrate or decumbent; twigs hirtellous; leaves irregularly denticulate (5) *hirtella.*
        - 2 ovules to each loculus.
            - Leaves broadly trigonous, ¾ mm. long (2) *depressa.*
            - Leaves trigonous, 1¼–1½ mm. long...... (4) *gracilis.*

** Flowers tinged with rose, 1½ cm. long.
Leaves deltoid, subacute; petals with a red median line towards the base; ovary glabrous ...... (6) *diosmoides.*
Leaves narrowly oblong, truncate, scabrid; petals with a red median line throughout; ovary pubescent .... (7) *Massoniana.*

1. T. UNIFLORA Solander ex Brongn. *op. cit.* 387, t. 38, f. 3; Sonder, *l. c.*; Oliver, *op. cit.* 331; and in Hook. Icon. Pl. t. 1013. *Schinzafra uniflora* O. Kuntze, *l. c.*

COAST REGION.—Stellenbosch Div.: At Sir Lowry's Pass, *Burchell, Herb. Kew*, 8274!

WITHOUT LOCALITY. —*Masson, & Van der Stell, Herb. Brit. Mus.*! *Herb. Cliffort*! *Herb. Bentham*!

2. T. DEPRESSA Oliver, *op. cit.* 332; and in Hook. Icon. Pl. t. 1012. *Schinzafra depressa* O. Kuntze, *l. c.*

COAST REGION.—Caledon Div.: Tops of the mountains of Baviaan's Kloof, near Genadendal, *Burchell, Herb. Kew*, 7678!

3. **T. thesioides** Dümmer, sp. nov. Fruticulus 15 cm. vel ultra altus, omnino glaber, e basi intricato-ramosus, ramis ascendentibus vel decumbentibus scabriusculis, floriferis lateralibus brevissimis. Folia minuta, adpressa, subimbricata, carnosula, scabriuscula, ovato-deltoidea, trigona, apice nigrescente obtusiuscula aut acuta; folia involucralia quam floribus terminalibus solitariis albidis breviora. Calycis segmenta scariosa, translucentia, ovata, acuta vel subcuspidata, extra carinato-costata, intra concava, denticulata. Petala sepalis æquilonga, anguste obovata aut oblonga, 1·5 mm. longa, complanata vel subconcava, inferne atropurpurea, staminibus duplo longiora. Stylus 0·5–0·7 mm. longus, stigmate capitato. Fructus maturus urceolatus, styli basi coronatus, nitidulus, atrobrunneus, 1·5 mm. longus.

CENTRAL REGION.—Ceres Div.: In stony places of mountains near Ceres, *Bolus, Herb. Norm. Aust. Afr.* 1152! in fissures of rocks at the foot of the mountains about Ceres, *Bolus, Herb. Kew*, 5490!

Superficially this species resembles the preceding *T. depressa* Oliv., but the very short styles, capitate stigmas, short stamens, and equally long calycine segments and petals afford characters which distinguish it from any of its allies.

4. T. GRACILIS Oliver, *l. c.*; Colozza, *op. cit.* pp. 27, 31. *Schinzafra gracilis* O. Kuntze, Rev. Gen. *l. c.*

COAST REGION.—Swellendam Div.: On a mountain peak near Swellendam, *Burchell, Herb. Kew*, 7414! 7342!

5. T. HIRTELLA Oliver, *l. c.* *T. uniflora* var. *hirtella* Oliv. in Hook. Icon. t. 1013. *Schinzafra hirtella* O. Kuntze, *l. c.*

COAST REGION.—Tulbagh Div.: On the Witzenberg Range, near Tulbagh, *Burchell, Herb. Kew*, 8685!

6. T. DIOSMOIDES Oliver in Hook. Icon. xxiv. t. 2314 (1894).

COAST REGION.—Clanwilliam Div.: On grassy slopes of the Cedarbergen, *Marloth*, 2665! Tulbagh Div.: Above the Waterfall, Tulbagh, 1100 ft., *Schlechter*, 1662! near Tulbagh, about 1150 ft., *Schlechter*, 1662! Coast Central Region.—Tulbagh Div.: Stony slopes of the Mostert's Berg, Mitchell's Pass near Ceres, *MacOwan*, 3088! Central Region.—Ceres Div.: Cold Bokkeveld, 4500 ft., *Schlechter*, 10,700! eastern slopes of the Skurfdeberg Range, near Gydouw, 4500 ft., *Bolus*, 7479!

Without Locality.—*Masson, Herb. Brit. Mus.*!

7. **T. Massoniana** Dümmer, sp. nov., affinis *T. diosmoidi* Oliv., sed habitu robustiore dense ramoso foliosoque, foliis oblongis superne incurvatis truncatis ustulato-apiculatis carnosulis dorso late costatis scabriusculis, floribus majoribus, ovariis pubescentibus differt.

A densely-branched ericoid subshrub, about ½ metre high (according to Masson). Leaves sessile, crowded, imbricate, ascending, incurved above, oblong, truncate, often surmounted by a blunt or acute blackish apiculus, 2–4 mm. long, subfleshy, broadly unicostate dorsally, flattened on the inner face, distinctly scaberulous, margin translucent. Flowers similar to *S. diosmoides* Oliv., but slightly larger in all their parts; ovary subglobose, pubescent.

Coast Region. — Stellenbosch Div.: Stellenbosch, *Masson, Herb. Mus. Brit.*!

VI. MNIOTHAMNEA

Niedenzu in Engler u. Prantl, *Pflanzenfamilien*, iii. 2a. 136 (1891). *Berzelia* (*Mniothamnea*) Oliver in Journ. Linn. Soc. ix. 333 (1867).

M. callunoides Niedenzu, *l. c.* *Berzelia callunoides* Oliver, *l. c.*, and in Hook. Icon. t. 1014 (1867).

Coast Region.—Swellendam Div.: On a mountain peak near Swellendam, *Burchell*, 7382! 7348! Riversdale Div.: On Kampsche Berg, *Burchell*, 7097; summit of the Kampsche Berg, *Burchell*, 7116!

N.B.—All the specimens cited are in the Kew Herbarium.

VII. RASPALIA

Brongniart in Ann. Sci. Nat. viii. 377 (1826); Hooker, *op. cit.* 672; Niedenzu, *op. cit.* 135. *Raspailia* Walpers, Rep. i. (1842), 544 (not J. & C. Presl). *Raspallia* Arnott in Hook. Lond. Journ. Bot. iii. (1841), 259. *Berardia* Brongn. *op. cit.* 380 (in part); Sonder, *op. cit.* 318 (in part).

Key to Species.†

* Leaves convex dorsally.
    Leaves glabrescent ventrally.
        Leafy twigs 5 mm. thick; flower-head dingy grey, woolly, 7–10 mm. in diameter; bracts equalling the flowers .... (6) *squalida*.

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† The status of *R. affinis* Nied. and *R. aspera* E. Mey. being doubtful, their omission from the key is entertained here.

Leafy twigs 3 mm. thick; flower-head orange-red, 4–5 mm. in diameter; bracts much shorter than the flowers..................... (7) *Dregeana.*
Leaves tomentellous ventrally.
Leafy twigs 1½–2 mm. thick .... (5) *passerinoides.*
** Leaves acutely keeled dorsally, deltoid, acute.
Leafy twigs 2 mm. thick; leaves inconspicuously downy. Habit decumbent .... (3) *angulata.*
Leafy twigs ½–1 mm. thick; leaves more or less glabrous. Habit erect.
Leaves ½–¾ mm. long; petals spreading .... (8) *trigyna.*
Leaves 1½–2 mm. long; petals incurved .... (9) *Schlechteri.*
*** Leaves obtusely keeled, rhombic, obtuse.
Leafy twigs 2 mm. thick. Flower-heads woolly (1) *microphylla.*

1. R. MICROPHYLLA Brong. *l. c.* t. 37, f. 1. *R. teres* E. Meyer, *op. cit.* 215. *Raspailia microphylla* Walp. Rep. *l. c.* *Raspailia teres* E. Meyer in Drège, Zwei Pfl. Doc. 116. *Berardia microphylla* Sonder, *op. cit.* 320. *Nebelia microphylla* O. Kuntze, Rev. Gen. i. (1891), 233. *Brunia microphylla* Thunb. Prod. Cap. 187; Diss. Brun. 6–7.

COAST REGION.—Paarl Div.: French Hoek, 4000 ft., *Schlechter*, 9270! Worcester Div.: Dutoit's Kloof, 3000–4000 ft., *Drège*, 6869, partly! (The remaining refer to *Grisebachia incana*, Klotsch, an Ericaceous plant.) Stellenbosch Div.: Hottentot's Holland Mountains, *Carmichael*! Sir Lowry's Pass, 1200–1600 ft., *Bolus*, 5547! *Herb. Norm. Aust. Afr.* 100! *Schlechter*, 5389! Caledon Div.: Tops of mountains, Baviaan's Kloof, near Genadendal, *Burchell*, 7679! stony mountain places near Genadendal, 3000–4000 ft., *Drège*! *Schlechter*, 9850! slopes of the Zwartberg, *Bowie*! *Bolus*, 6905! 7388! Vogelgat, 3000 ft., *Schlechter*, 9563!

WITHOUT LOCALITY.—*Zeyher*! *Masson*!

2. R. AFFINIS Niedenzu, *op. cit.* *Berardia affinis* Sonder, Fl. Cap. ii. 320 (not Brongniart). *Nebelia Sonderiana* O. Kuntze, Rev. Gen. i. 233 (1891).

I have not seen this species, but according to Sonder it is "like *B. microphylla*, but distinguished by the obtuse, 1 line long, canaliculate leaves and imbricate villous heads; ovary pubescent; stamens not seen." He quotes Wupperthal, 1500–2000 ft., as the locality, and specimen 6867 of Drège.

3. †R. ANGULATA Niedenzu, *l. c.* (not E. Meyer). *R. struthioloides* Sonder, *op. cit.* 320, in syn. *Raspailia struthioloides* Presl, Bot. Bemerk. 40. *Berardia angulata* Sonder, *op. cit.* 320. *Nebelia angulata*, O. Kuntze, Rev. Gen. i. 233 (1891).

COAST REGION.—Worcester Div.: Dutoit's Kloof, 3000–4000 ft., *Drège*, *Herb. Kew*, 6868!

4. R. ASPERA E. Meyer, *op. cit.* 215; Niedenzu, *l. c.* *Raspailia aspera* E. Meyer, *op. cit.* 110. *Berardia aspera* Sonder, *op. cit.* 321. *Nebelia aspera* O. Kuntze, *l. c.*

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† The specimens of Drège so named at Kew are identical with *Erica modesta* Salisb.

Coast Region. — Caledon Div.: Between Kromrivier and Pietersfontein, *Drège*.

This species is unknown to me. Sonder states: "The leaves 1 line long, 3–4 in a whorl; the flower-heads the size of a pea." As the flowers were, however, not seen by him, it remains an open question whether the said plant has been rightly assigned, or whether it may not represent some Ericaceous plant, as in the case of Meyer's *R. angulata*, which specimen Sonder quotes under that species.

5. R. passerinoides Oliver in Hook. Ic. Pl. t. 1524. *Raspailia passerinoides* Presl, Bot. Bemerk. 39. *Brunia passerinoides* Schlecht. in Linnæa, vi. 190 (1831); Eckl. & Zeyh. Enum. Pl. 139. *Nebelia phylicoides* Sweet, Hort. Brit. 116 (1830). *Berardia phylicoides* Brongn. *op. cit.* 381; Sonder, *l. c.*

Coast Region.—Caledon Div.: Southern slopes of a mountain at the back of Houw Hoek, 2600 ft., *Bolus*, 5488! *Schlechter*, 7339! Nieuwe Kloof, *Burchell*, 8102! Zwartberg, above the springs, *Ecklon & Zeyher*, 1064! *Bowie*!

Var. robusta Dümmer, comb. nov. *R. phylicoides*, Niedenzu, *l. c.* *R. phylicoides* var. *robusta* Colozza in Ann. di Bot. Roma, ii. 33 (1905). *Berardia phylicoides* var. *robusta* Sonder, *l. c.* *Brunia phylicoides* Thunb. Fl. Cap. 207; Diss. Brun. 7. *Brunia deusta* Willd. in Denksch. Akad. Moench. 127, t. 4, f. 2, 1808 (not of Thunb.). *Phylica squamosa* Willd. ex Sonder.

Interior Regions.—*Thunberg & Niven, Herb. Thunb. Willd. Sond.* ex Sonder, Fl. Cap. 321.

6. R. squalida Dümmer, comb. nov. *Brunia squalida* Sond. Fl. Cap. ii. 315. *Diosma squalida* E. Meyer in Drège, Zwei Pfl. Doc. 179. *Pseudobœckea squalida* Niedenzu, *op. cit.* 136.

Coast Region. — Stellenbosch Div.: Hottentot's Holland Mountains; Sir Lowry's Pass, *Burchell*, 8216! 1200 ft., *Bolus*, *Herb. Norm. Aust. Afr.* 135! *Masson*, without locality, *Herb. Brit. Mus.*!

Without Locality.—In *Herb. Forsyth, Kew*!

The specimens cited agree with Sonder's description of *Brunia squalida*, but in their dehiscent fruit they exhibit a closer approximation to *Raspalia*, to which they are consequently referred.

7. R. Dregeana Niedenzu, *l. c.* *Raspalia phylicoides* Sonder, *l. c.* in syn. *Raspailia phylicoides* Presl, Bot. Bemerk. 39. *Brunia phylicoides* E. Meyer, *op. cit.* 169 (not Thunb.). *Berardia Dregeana* Sond. Fl. Cap. ii. 321. *B. velutina* Schlechter in Journ. Bot. (1898), 25. *Nebelia Dregeana* O. Kuntze, Rev. Gen. 233, (1891).

Coast Region.—Clanwilliam Div.: Ezelsbank, 3000–4000 ft., *Drège, Herb. Kew*! Worcester Div.: On the Matroosberg, 5600 ft., *Bolus*, 6362! 5000 ft., *Marloth*, 2255!

8. R. trigyna Dümmer, comb. nov. *Berardia trigyna* Schlechter in Journ. Bot. (1898), 315; Wood in Trans. Phil. Soc. xviii. ii. 155 (1908).

Eastern Region.—Pondoland: In wet places near Murchison, *Wood*, 3029! Along the streams behind the River Enkweni, *Bachmann*, 1668, 1669, 1670, 1671, 1680. Natal: *Sutherland, Herb. Kew*!

Sutherland's specimens at Kew bear only 2-styled flowers, and hence I am inclined to suspect that the 3-stylar character mentioned by Schlechter represents some abnormality.

9. **R. Schlechteri** Dümmer, sp. nov. *Fruticulus* 0·3 m. vel ultra altus, *Erica margaritaceæ* Sol. habitu, ramis subfastigiatis, junioribus brevibus pilosulis foliatis. *Folia* minuta, spiraliter subimbricata, sessilia, adpressa, oblonga, 2 mm. vix longa, obtusiuscula, ustulata, paulo barbata, subcarnosula, subtus convexo-carinata vel convexa, demum utrinque glabra, integra. *Capitula* plurima, nuda, globosa, 2–4 mm. diametro, 5–12 flora, albida, ramulos laterales breves terminantia; pedicelli perbreves; bracteolæ oppositæ, minutæ, subulatæ, ciliolatæ vel denticulatæ. *Calycis* segmenta late deltoidea, obtusa vel interdum subbifida, margine ciliolati excepto omnino glabra. *Petala* calyce duplo longiora, obovata vel oblonga, paulo cucullata, glaberrima. *Ovarium* ovoideo-globosum, superne albo-tomentellum; styli duo, perbreves, subrecurvati, obtusi, glabri.

COAST REGION. — Riversdale Div.: Langebergen Range, 200 mm. *Schlechter*, 1750!

A plant with the facies of *Erica margaritacea* Sol.; it differs from the enumerated species, except *R. trigyna* Schlechter, in the smaller, subnude flower-heads, and from that species by the comparatively larger leaves, more globose inflorescences, white, not tawny flowers, and incurved, cucullate petals.

VIII. PSEUDOBÆCKEA

Niedenzu, *op. cit.* 136; Colozza, *op. cit.* 36. *Bæckea* Burm. Prod. 12 (1768) (not Linnæus). *Beckea* Ecklon & Zeyher, Enum. 139 (not of Persoon or St. Hilaire). *Brunia* Brongn. *op. cit.* 374–377; Hooker, *op. cit.* 671 (in part); Sonder, *op. cit.* 313 (in part).

KEY TO SPECIES.

* Flowers aggregated in heads, racemes, or panicles.
† Ovary villous.
Leaves patently spreading. Flower-head 4–5 mm. in diameter.
Shrubby, robust. Leaves trigonous, glabrous (3) *capitellata.*
Decumbent, slender. Leaves flat, herbaceous, sparingly villous .... (7) *villosa.*
Leaves ascending or appressed, imbricate, convex, very villous. Flower-head 6–8 mm. in diameter (8) *sacculata.*
†† Ovary glabrous.
Leaves ericoid, closely appressed to the axis, small, 2–3 mm. long, glabrous without, tomentellous within .... (2) *virgata.*
Leaves not ericoid, ascending or spreading, ½–2 cm. long.

Leaves linear, obtuse, slightly convex .... (1) *pinifolia.*
Leaves ovate-lanceolate, attenuate at the base, flat.
  Decumbent. Leaves herbaceous, apparently nerveless, thinly hairy; twigs with spreading hairs .... (6) *gracilis.*
  Shrubby, erect. Leaves coriaceous, 1–3-nerved, thinly pilose or glabrous .... (5) *racemosa.*
Leaves broadly ovate, often subcordate, cuspidate, 3–5-nerved .... (4) *cordata.*

** Flowers solitary, axillary.
  Ovary glabrous. Flowers longer than the leaves. Leaves rhombic, minute, glabrous; tipped with a black awn-like deciduous apiculus. (10) *teres.*
  Ovary villous. Leaves lanceolate, subacute, densely villous, 4 mm. long .... (9) *palustris.*

1. P. PINIFOLIA Niedenzu, *l. c.*; Colozza, *op. cit.* pp. 19, 37. *P. pinifolia*, var. *a* and *b*, Colozza, *l. c.* *Brunia pinifolia* Brongn. *op. cit.* 375; Sonder, *l. c.*; E. Meyer, *l. c.* *B. pinifolia*, var. *a* and *b*, Sonder, *l. c.* *B. thrysophora* Walp. Rep. i. 544. *Beckea thrysophora* and *africana* Eckl. & Zeyh. *l. c.* *B. thyrsiflora* Sonder, *l. c.* in syn. *Bæckea africana* Burm. *l. c.* *B. thyrsiflora* and *B. thyrsophora*, ex Ind. Kew. i. 262. *Linconia tamariscina* E. Mey. in Drège, Zwei Pfl. Doc. 199. *Phylica pinifolia* Linn. f. Supp. 153; Thunb. Prod. 44; DC. Prod. ii. 37.

COAST REGION.—Clanwilliam Div.: *Zeyher*! on the mountains near the Oliphant's River, *Ecklon & Zeyher*, 1069! Tulbagh Div.: above the waterfall, Tulbagh, 1500 ft., *Bolus*, 5048! Worcester Div.: Dutoit's Kloof, 3000–4000 ft., *Drège, a*! *Drège*! Paarl Div.: French Hoek, 2500 ft., *Schlechter*, 9346! Cape Div.: Table Mountain, Orange Kloof, *Marloth*, 2751! *Herb. Dümmer*, 925! Caledon Div.: near Palmiet River, *Ecklon & Zeyher*, 1068.

WITHOUT LOCALITY.—*Niven*, 59! 61! *Scholl*! *Herb. Forsyth, Bentham*!

Var. HEMISPHÆRICA Dümmer, var. nov. a typo, floribus in capitulis terminalibus hemisphæricis congestis, recedit.

Flowers crowded in terminal solitary hemispheric heads, 6–8 mm. in diameter; flowers and leaves as in the type, the latter slightly shorter, 8–12 mm. long, and drying a dark chestnut-brown.

COAST REGION. — Swellendam Div.: summit of a mountain peak near Swellendam, *Burchell, Herb. Kew*, 7346!

2. P. VIRGATA Niedenzu, *l. c.*; Colozza, *op. cit.* 37. *Brunia virgata* Brongn. *op. cit.* 376; Ecklon & Zeyher, Enum. Pl. 139; Sonder, *op. cit.* 315.

COAST REGION.—Swellendam Div.: Near Puspas Valley, Swellendam, *Ecklon & Zeyher*, 1065! summit of a mountain peak near Swellendam, *Burchell*, 7363!

Var. ROBUSTIOR Colozza, *l. c.* pp. 20, 37. *Brunia virgata* v. *robustior* Sonder, *l. c.* *B. verticillata* Ecklon & Zeyher, *l. c.*

COAST REGION.—Swellendam Div.: Zondereinde River, above Linde, *Ecklon & Zeyher, Herb. Kew*, 1066!

WITHOUT LOCALITY.—*Zeyher, Herb. Kew*, 2652!

3. P. CAPITELLATA Niedenzu, *l. c.* *Brunia capitellata* E. Meyer in Drège, Zwei Pfl. Doc. 169. *B. staavioides* Sonder in Fl. Cap. ii. 316. *Raspailia capitella* Presl, Bot. Bemerk. 39. *Raspalia capitella* Sonder, *l. c.* in syn.

COAST REGION.—Clanwilliam Div.: Blaauw Berg, 3000–5000 ft., Honigvalei and on the Koude Berg, 3000–4000 ft., *Drège*, *Herb. Kew*! Pakhuis Berg, 2000 ft., *Schlechter*, 10802!

4. P. CORDATA Niedenzu, *l. c.* Colozza, *op. cit.* pp. 20, 36. *Brunia racemosa* Brongn. *op. cit.* 374 (not Sonder). *Bæckea cordata* Burm. Prod. 12.

COAST REGION.—Bredasdorp Div.: Elim, 350 ft., *Schlechter*, 9646! 400 ft., *Bolus*, 8609! Swellendam Div.: On the Tradouw and Groote Vaderbosch Berg, *Bowie*! Uitenhage Div.: Uitenhage, *Zeyher*, 593!

WITHOUT LOCALITY. — *Masson*! *Niven*! *Moggridge*! *Herb. Hooker*! *Bentham*!

Var. CONFUSA Dümmer, nom. nov. *Brunia cordata* Walp. Rep. i. 544 (1842); Sonder, *op. cit.* 314. *Beckea cordata* Ecklon & Zeyher, Enum. 140.

Leaves 3-5-nerved, larger and more villous than the type, 12–18 mm. long.

COAST REGION. — Stellenbosch Div.: Stellenbosch, *Zeyher*, *Herb. Kew*! Hottentot's Holland Mountains, near Grietzesgat, *Ecklon & Zeyher*, *Herb. Kew*, 1072!

An extremely variable and perplexing species, whose limits are difficult to define. The specimens of *Bolus*, 8609, and *Schlechter*, 9646, appear to be distinct, but in the absence of flowers or fruit this point remains undecided.

5. P. RACEMOSA Niedenzu, *l. c.*; Colozza, *op. cit.* pp. 20, 36. *Brunia lancifolia* Walp. Rep. i. 544 (1842). *B. racemosa* Sond. *l. c.* (not Brongn.). *B. laurifolia* Sond. *l. c.* in syn. *Bæckea lancifolia* and *laurifolia*, ex Kew Ind. i. 262. *Beckea lancifolia* Eckl. & Zeyh. Enum. Pl. 140. *B. laurifolia* Sond. *l. c.*

COAST REGION.—Paarl Div.: French Hoek, 2300 ft., *Schlechter*, 9288! Swellendam Div.: Tradouw Mountains, 1500–2000 ft., *Drège*, 6856 *b*! Puspas Valley, *Ecklon & Zeyher*, 1070! Riversdale Div.: Garcias Pass, *Burchell*, 7033! George Div.: Wolfdrift, Malgaten River, *Burchell*, 6112! on the Cradock Berg, near George, *Burchell*, 5957! Uniondale Div.: Long Kloof, about the source of the Keurboom River, *Burchell*, 5068! 5076! near Grootfontein, 2000 ft., *Drège*, 6856 *b*! Humansdorp Div.: Humansdorp, 200 ft., *MacOwan*, 967! 270!

WITHOUT PRECISE LOCALITY. — *Mund*! *Niven*! *Masson*! in *Herb. Hooker*! *Forsyth*! *Hance*, 4647!

Var. *b*, Colozza, *op. cit.* 36. *Brunia racemosa*, var. *β*, Sonder, *l. c.* *Brunia racemosa* Walp. Rep. i. 543. *Beckea racemosa* Eckl. & Zeyh. *op. cit.* 140. *Bæckea racemosa*, ex Kew Ind. i. 262. *Phylica racemosa* Linn. Mant. 209; Thunb. Prod. 45.

COAST REGION. — Worcester Div.: Near Hex River, *Ecklon & Zeyher*, 1071. Uitenhage Div.: Van Stadensberg, *Zeyher*, 2225.

The narrower, ovate-lanceolate, coriaceous, apparently 1-nerved leaves usually serve to distinguish this species from the preceding; the glabrous character is unreliable, as specimens referable to this species have often sparingly pilose leaves, and thus differ in this respect but little from *P. cordata* Nied. The variety is unknown to me, but from the meagre description it scarcely appears separable from the type. Burchell's specimen, no. 5076, exemplifies a case of sterilization where, by the almost complete abortion of the flowers, an extension of the flowering axes has resulted, leading to the formation of a series of subterminal foliaceous pseudo-whorls, which have completely changed the general aspect of the plant in question.

Schlechter's no. 9288 represents a transitory stage between this and the preceding species.

6. **P. gracilis** Dümmer, sp. nov. *Planta* prostrata vel diffusa, ramis gracillimis parce ramosis vel interdum ramosissimis teretibus lævibus pilosis castaneis. *Folia* distincte alterna vel subopposita, subpatula, internodiis æquilonga vel longiora, ovato-lanceolata vel lanceolata, apice nigro notata, superne sensim acuminata vel cuspidato-acuminata, inferne subrotundata vel obtusa, 5–12 mm. longa, 2–4 mm. lata, sicco tenuiter chartacea, brunea, utrinque obscure unicostata et reticulata, plus minusve adpresse pilosa, longe ciliata. *Flores* axillares, plerumque apices versus ramulorum lateralium spicam brevem simulantes positi; bracteolæ binæ, minutæ, subhyalinæ, puberulæ. *Calycis* segmenta rotundata, glaberrima, hyalina, integra, petalis albidis duplo breviora. *Ovarium* superne puberulum, inferne glabrum, verrucosum, castaneum.—*Brunia racemosa* E. Meyer, *l. c.*, non Brongniart.

Coast Region. — Worcester Div.: Dutoit's Kloof, 1000–2000 ft., *Drège, a*; 3000–4000 ft., *Drège, b, Herb. Kew*!

It exhibits affinities to *P. racemosa* Niedenzu, but differs in the prostrate or diffuse, exceedingly slender habit, sessile thin papery unicostate pilose and ciliate leaves, and the disposition of the flowers. Specimens *b* of Drège differ in having more coriaceous, whitish punctate leaves, but in other respects agree with specimens *a*, and may be regarded as conspecific.

7. P. villosa, Niedenzu, *op. cit.* 136. *Brunia villosa* E. Mey. *l. c.*; Sonder, *l. c.* *Raspailia villosa* Presl, Bot. Bemerk. 39. *Raspalia villosa* Sonder, *l. c.* in syn.

Coast Region. — Clanwilliam Div.: Rocky places on the Blaauw Berg, 4000–5000 ft., *Drège, Herb. Kew*!

8. P. sacculata Dümmer, comb. nov. *Brunia sacculata* Bolus ex Kirchner, Beitr. Kennt. Brun. 15 (1904).

Superficially resembling *P. palustris*, but divaricately-branched, and of a more decumbent habit, the lower branches subnude and smoky, the upper densely greyish pilose and leafy. Leaves sessile, imbricate, narrowly ovate to linear lanceolate, subacute, 2–5 mm. long, pilose above and below, or eventually glabrous on the upper surface. Flower-heads terminal, solitary, hemispherical, 6–12 flowered, the interspersed leafy bracts shorter or scarcely exceeding the flowers in length. Petals broadly obovate or oblong, equalling the calyx-segments or slightly longer.

Central Region.—Ceres Div.: Stony slopes of the Skurfdeberg Range, near Gydouw, 5000 ft., *Bolus*, *Herb. Norm. Aust. Afr.* and *Kew*, 1154!

9. P. palustris Dümmer, comb. nov. *Brunia palustris* Schlechter ex Kirchner, Beitr. Kennt. Brun. Breslau (1904), 15.

A much branched, greyish, densely pilose shrublet, with crowded subfastigiate twigs. Leaves crowded, erect, imbricate, sessile, lanceolate or narrowly ovate, subacute, tipped with a black apiculus, long, slightly convex, sparingly pilose without, glabrous and shining with a slightly elevated midrib within, ciliate. Flowers solitary, axillary, very shortly pedicellate, disposed in the axils of the upper leaves and shorter than them. Bracteoles 2, opposite, subulate, pilose, ferruginous, 1–1½ mm. long. Calycine segments narrowly ovate, as long as the bracteoles, pilose without, glabrous within; the petals shorter, obovate, glabrous, whitish above, brownish below, slightly incurved, and enclosing the stamens and styles. Ovary tomentellous.

Central Region.—Ceres Div.: Klein Vley, Cold Bokkeveld, 5500 ft., *Schlechter*, *Herb. Brit. Mus.* and *Kew*, 10,055!

10. P. teres Dümmer, comb. nov. *Brunia teres* Oliver in Journ. Linn. Soc. Bot. ix. 333 (1867).

Coast Region. — Caledon Div.: Tops of the mountains of Baviaan's Kloof, near Genadendal, *Burchell*, *Herb. Kew*, 7700! A specimen in the British Museum collected by Niven, but without locality.

A peculiarly distinct species, with the aspect of *Thamnea gracilis* Oliver.

IX. STAAVIA

Dahl, Obs. Bot. 14 (1787); DC. Prod. ii. 45 (1825); Brongn. *op. cit.* 378 (1826); Sonder, *op. cit.* 321; Hooker, *op. cit.* 672; Niedenzu, *op. cit.* 136. *Stavia* Thunb. Nov. Gen. vii. 108 (1792); Fl. Cap. 207 (1823). *Levisanus* Schreb. Gen. i. 149 (1789). *Astrocoma* Neck. Elem. i. 112 (1790). *Brunia*, of various authors.

The genus was accredited to Thunberg by Sonder, but the name dates back to Dahl, who published a very complete account of the genus and the species then known, viz. *S. glutinosa* and *S. radiata* in his *Observationes Botanicæ* in 1787.

Key to Species.

* Flowers capitate.
† Flower-heads large, 13–35 mm. in diameter.
Bracts white, linear to oblong, much longer than the flowers. Flowers glutinous.
Flower-heads 2½–3½ cm. in diameter.
Leaves 2–2½ mm. broad .... (3) *Dodii.*
Flower-heads 1½–2 cm. in diameter.
Leaves 1–1½ mm. broad .... (1) *glutinosa.*

Bracts pale flesh, elliptic or spatulate, scarcely exceeding the flowers. Flowers glutinous .... (4) *Brownii.*

†† Flower-heads small, 3–10 mm. in diameter.

a. Bracts leafy, inconspicuous, shorter or rarely exceeding the flowers.

Flower-heads 3–4 mm. in diameter; twigs entirely glabrous .... (8) *nuda.*

Flower-heads 6–10 mm. in diameter; twigs pubescent or pilose.

Flower-heads terminally disposed.

Flower-head flat, glutinous; leaves patently spreading, truncate or obtuse (7) *capitella.*

Flower-head convex, woolly; leaves ascending subacute, very pilose ...... (9) *globosa.*

Flower-heads laterally disposed......... (6) *lateriflora.*

b. Bracts whitish, invariably exceeding the flowers.

Flowers not glutinous. Leaves subacute, often pilose .... (5) *radiata.*

Flowers glutinous. Leaves truncate, glabrous with a broad, prominent, dorsal midrib .... (2) *Dregeana.*

** Flowers spicate.

Spike ovoid or globose, 1–5 cm. long; leaves lanceolate, 1–1½ cm. long .... (10) *Zeyheri.*

1. S. GLUTINOSA Dahl, *op. cit.* 17; Willd. Sp. Pl. i. 1144 (1797), and in Densch. Akad. Moench. 134; Wend. Coll. Pl. 66, f. 22 (1805); Lodd. Bot. Cab. t. 852 (1824); DC. *l. c.*; Brongn. *op. cit.* 379; Ecklon & Zeyh. Enum. 140 (1835); Sonder, *op. cit.* 322; Colozza, *op. cit.* 21. *S. glaucescens* E. Meyer in Drège, Zwei Pfl. Doc. 223. *Stavia glutinosa* Thunb. Prod. 41 (1794); Fl. Cap. 207. *Brunia glutinosa* Berg. Cap. 57; Linn. Mant. ii. 210. *B. coronata* Linn. Mant. *l. c.* in syn. *B. colorata* Houttyn, Linn. Pl. Kruid Kund. vi. 333 (1775), in syn.

COAST REGION.—Cape Div.: Table Mountain, *Burchell*, 529! *Pappe*! *Ecklon & Zeyher*, 1074! *MacGillivray*, 636! *Milne*, 136! 1000–2000 ft., *Drège*! *Harvey*! Waai Vlei, *Wolley Dod*, 873! *Dümmer*, 641! In *Herb. Dümmer*, 42! Swellendam Div.: In rocky situations of the Tradouwberg, *Bowie*, *Brit. Mus.*!

WITHOUT LOCALITY.—*Niven*! *Oldenburg*! *R. Brown*! *Nelson*! *Harvey*! *Abel*! *Zeyher*! *Forster*! and in *Herb. Linnæus*!

On the Cape Peninsula *S. glutinosa* frequents the streams and slopes of partially shaded kloofs of Table Mountain, luxuriating in fairly dense undergrowth at elevations of 1000 to 3000 ft., and flowers promiscuously throughout the year; it occurs also sparingly on Devil's Peak and the mountains southwards, while its detection on the Tradouwberg by Bowie upsets the former assumption of the plant's endemicity to this region.

The elegant habit of the species, combined with the beauty of its flower-heads, which are not unlike certain rayed Composites, are points, worthy of cultural attention. Plukenet's figure, which is occasionally included in the synonymy, probably represents *Stilbe vestita* Berg, a Verbenaceous plant.

2. S. Dregeana Presl, Bot. Bemerk. 39 (1844). *S. nuda* Eckl. & Zeyh. Enum. 141, in part (not Brongn.). *S. radiata* var. *glabrata* Sond. *l. c.* *S. capitella* Bolus & Dod in Trans. S. A. Phil. Soc. xiv. iii. 264 (not Sonder).

Coast Region.—Paarl Div.: Drakenstein Mountains, 3000–4000 ft., *Drège*, 6873! 6873*a*! Cape Div.: Table Mountain, in fissures of rocks, 3500 ft., *Bolus*, 4490! *Burchell*, 528! *Herb. Dümmer*, 641! Swellendam Div.: on the Tradouwberg and Grootevader's Bosch Berg, *Bowie*!

Without Locality.—*R. Brown*! in *Herb. Caley*! *Hooker*!

This I consider specifically distinct and not a variety of *S. radiata* Dahl. Like *S. glutinosa* Dahl the flowers are congested in an agglutinated mass, but the ascending, not radiately spreading involucral bracts, though exceeding the flowers in length, are comparatively short and invariably leafy. It is a rare plant on the Cape Peninsula, usually confined to the crannies of rocks on the tops of mountains, and in consequence stunted, branching profusely from near the base, entirely glabrous, the leaves crowded, patently spreading, subtrigonous with a broad dorsal midrib.

3. S. Dodii Bolus in Hook. Ic. Pl. t. 2558 (1899).

Coast Region.—Cape Div.: On stony hills near Smit's-Winkel Bay, *Bolus*, 7988! *Wolley Dod*, 2641!

Without Locality.—*Masson*! *MacGillivray*, 636! *Grey*! In *Herb. Lindley*!

A very distinct and handsome species, with the aspect of a shrubby Chrysanthemum. It appears to be endemic to the Cape Peninsula, and even within this area its distribution is remarkably circumscribed and local, for in recent years it has only been gathered on a rocky ridge near Smit's-Winkel Bay, towards Cape Point. The specimens by Admiral Sir F. Grey and MacGillivray in the Kew Herbarium doubtless hail from the same region, for both made extensive collections about Simonstown, a locality not remote from the plant's present area of distribution.

4. **S. Brownii** Dümmer, sp. nov. *Frutex* ramosissimus, circiter unimetralis, ramulis florentibus simplicibus circ. 3 cm. longis vel superne corymbosim ramosis ascendentibus dense foliatis pilosulis. *Folia* erecto-patentia, subimbricata, paulo incurvata, breviter petiolata, petiolo complanato pilosulo persistente; lamina lanceolata vel lineari-lanceolata, obtusa vel truncata, 8–10 mm. longa, pagina inferiore valde unicostata, superiore unisulcata, coriacea, utrinque albo-punctulata et demum glabra, margine obscure incrassata, basin versus parce pilosa. *Capitula* terminalia, solitaria, 1·2 cm. diametro; involucri bracteæ imbricatæ 1–3-seriatæ, scariosæ, floribus æquilongæ vel vix excedentes, sicco pallide carneæ, exteriores late ovatæ vel oblongo-spatulatæ, 5–6 mm. longæ, extra medio-costatæ, glabræ, intra puberulæ, albo-punctulatæ, interiores paulo longiores, anguste spatulatæ, rotundatæ, obtusæ, subacutæ vel cuspidatæ; receptaculum planiusculum squamulis multis subulatis valde papposis pilisque rectis niveis instructum. *Calycis* basi valde pilosi, segmenta subulata, superne

pilosa, petalis oblongis glabris incrassatis æquilonga vel illa vix superantia. *Stamina* glabra quam petalis breviora, antheris anguste oblongis. *Stylus* glaber, stigmate obtuso vel truncato.

Coast Region. — Stellenbosch Div.: Hottentot's Holland Mountains. A fragment in the British Museum with an appended note stating the height of the species to be 4–5 ft., but without reference as to collector. A specimen in the Kew Herbarium from the Liverpool Botanic Gardens.

This interesting acquisition to the Staavias differs chiefly from its congener *S. Dodii* Bolus in its copiously branching and larger habit, more tapering leaves with a prominent dorsal midrib, smaller eglutinous flower-heads, surrounded by one to three series of more or less ovate, scarious, dorsally keeled pale flesh-coloured bracts, which rarely exceed the flowers in length.

No information is forthcoming which might throw light on the precise origin of the specimen in the Kew Herbarium from the Liverpool Botanic Gardens; moreover, it is significant that in recent years this plant has not been rediscovered, despite its reputed size and its occurrence on the Hottentot's Holland Range, a locality favoured by many field-botanists, which suggests that, like many other endemic types, it has suffered extinction. The invaluable researches of Mr. N. E. Brown, A.L.S., in the South African field of botany has led me to name this species in compliment to him.

5. S. radiata Dahl. *op. cit.* 15; Willd. *l. c.*, and in Densch. Akad. Moench. 133 (1809); DC. Prod. 45; Brongn. *l. c.* t. 2, f. 2; Sonder, *l. c.*; Colozza, *op. cit.* 22. *Staavia pinifolia* Willd. in Denk. *l. c.* t. 3, f. 2. *Stavia radiata* Thunb. Prod. 41 (1794). *Phylica radiata* Linn. Cent. Pl. i. 8. *Brunia radiata* Berg. Desc. Pl. Cap. 58 (1767); Linn. Mant. 209 (1771).

Coast Region.—Cape Div.: Table Mountain and Devil's Peak at varying elevations, *Milne*, 135! *Drège*, *b*! *Ecklon & Zeyher*, partly! *Pappe*! *Ecklon*, 767! *Dümmer*, 4! *Bowie*! *Rehmann*, 1240! *Wolley Dod*, 529! 259! Witteboom, between Wynberg and Houtbay, *Drège*, *c*! *Wallich*! between Cape Flats and Stellenbosch, *Burchell*, 8372! Cape Flats, *Rehmann*, 2026! 2027! near Rondebosch, *Burchell*, 711! 835! 193 partly! *Zeyher*, 726 partly! near Newlands, *Wilms*, 3119 *e*! near Cape Town, *Niven*! summit of the Vlaggeberg, 2900 ft., *Schlechter*, 212! Constantiaberg, *Wolley Dod*, 1936! Muizenberg, *MacOwan*, 185! *Dümmer*, 1286! Fish Hoek, *Wolley Dod*, 705! Simonstown, *MacGillivray*, 634! *Kirk*! *Wright*! Stellenbosch Div.: Between Jonker's Hoek and Sir Lowry's Pass, *Burchell*, 8321! Hottentot's Holland Mountains, *Ecklon & Zeyher*, 1075! Stellenbosch, *Zeyher*! Caledon Div.: Houw Hoek, 1500 ft., *Bolus*, 1155! Swellendam Div.: Swellendam Mountains, *Bowie*!

Without Locality.—*Pallers*! *Forster*! *Masson*! *Thunberg*! *Wallich*! *Thom*, 57! *Herb. Linnæus*! *Lindley*! and *Gay*!

Var. ericetorum Eckl. & Zeyh. Enum. *l. c.*; Sonder, *l. c.*

Coast Region.—Cape Div.: Between Wynberg and Houtbay, *Drège*, *c*, partly! foot of Table Mountain and Devil's Peak, *Ecklon*

& Zeyher, partly! Cape Flats, *Pappe*, partly! *Zeyher*, 726! *Ecklon*, 768 partly! *Burchell*, 825 and 193 partly! False Bay, sand dunes, *Schlechter*, 799!

WITHOUT LOCALITY.—*Masson*! and *Herb. Forsyth*!

A most ubiquitous species, occurring at all elevations from the flats to mountain tops, but most abundant on the sandy low-lying flats among the restiaceous element. The variety insensibly passes into the type, but extreme forms are distinguished by the slender and more glabrous twigs, smaller leaves and flower-heads.

6. S. LATERIFLORA Colozza in Nuov. Giorn. Bot. Ital. x. 397 (1903), and in Ann. di Bot. Roma, ii. pp. 24, 36, t. ii. (1905).

COAST REGION.—Cape Div.: Between Rondebosch and Wynberg, *Burchell*, *Herb. Kew* and *Florence*, 7634! Caledon Div.: Genadendal, 1500 ft., *Schlechter*, *Herb. Kew* and *Brit. Mus.*, 9842!

Closely allied to the following, but with the flower-heads more or less laterally disposed.

7. S. CAPITELLA Sonder in Fl. Cap. ii. 323; Colozza, *op. cit.* 23. *S. rupestris*, *S. nuda* (in part), and *S. ciliata* Ecklon & Zeyher, Enum. Pl. 141. *S. comosa* Colozza in Ann. di Bot. Roma, ii. 32, 35, t. i. *Brunia comosa* Thunb. in Hoffm. Phytog. Bl. i. 17 (1803); Diss. Brun. 5. *B. capitella* Thunb. Diss. Brun. 5. *B. Dregeana* Presl, Bot. Bemerk. 39.

COAST REGION.—Cape Div.: Table Mountain, *Ecklon & Zeyher*, 1078! Cape Flats, *Bowie*! Caledon Div.: Rocky and stony places on the mountains near Genadendal, 3000–4000 ft., *Drège*, 6855! Zwartberg, *Ecklon & Zeyher*, 1077! Houw Hoek, *Schlechter*, 9391! Villiersdorp, *Bolus*, 5049! Bredasdorp Div.: On slopes near Elim, *Bolus*, 6906!

WITHOUT LOCALITY.—*Forster*! *Roxburgh*! *Herb. Miers*!

Var. COMPOSITA Sonder, *l. c.* *Staavia adenandriæfolia* Ecklon & Zeyher, Enum. 141.

COAST REGION.—Caledon Div.: Zwartberg, *Niven*, 17! Bredasdorp Div.: On mountain slopes near Elim, *Bolus*, 6907! Swellendam Div.: Swellendam, *Bowie*!

The error of associating *Brunia comosa* Thunb. with *Berzelia lanuginosa* Brongn. var. *glabra* Sond. has been pointed out by Colozza, who in consequence has proposed the combination *Staavia comosa* Colozza; his photograph I. of Thunberg's specimen bears, however, such a striking resemblance to *S. capitella* Sonder, that I have no alternative but to include this combination and its synonymy in that of the latter species.

In herbaria *S. capitella* Sond. is apt to be confounded with *S. radiata* Dahl., but the bracts surrounding the flower-heads are invariably leafy, rarely white, and seldom exceed the flowers in length; it is however, not improbable that cases of hybridity occur, a supposition which is strengthened by the occurrence of intermediate forms between these two critical species. The variety *composita* is well defined, and exhibits a peculiarity which is, however, not confined to it, and that, the tendency of the deeply sulcate styles to divide at maturity, when the apparently 2-styled flowers are difficult to distinguish, unless carefully dissected, from certain species of *Pseudobæckea*.

8. S. NUDA Brongniart in Ann. Sci. Nat. viii. 379 (1826); Sonder, *l. c.* *Brunia verticillata* * Linn. f. Supp. 156; Thunb. Prod. 41; Willd. Sp. Pl. i. 1142; E. Meyer in Drège, Zwei Pfl. Doc. 169. *B. alopecuroides* Presl, *l. c.* (not Thunb.).

COAST REGION.—Worcester Div.: Dutoit's Kloof, 3000–4000 ft., *Drège, a*! *Drège, a a*! *Drège, b*! Swellendam Div.: Zondereinde River, *Niven*, 19! Cascade River, *Niven*!

WITHOUT LOCALITY.—*Nelson, Herb. Brit. Mus.*!

9. S. GLOBOSA Sonder, *l. c.* *S. ciliata* Brongn. *op. cit.* 380? *Phylica trichotoma* Thunb. Prod. 187. *P. globosa* Thunb. Diss. 8. *P. elongata* Willd. ex Sonder, *l. c.*

COAST REGION.—Paarl Div.: French Hoek Kloof. A specimen in Herb. Brit. Mus., but without collector's name.

WITHOUT LOCALITY.—*R. Brown & Masson, Herb. Brit. Mus.*, *Herb. Forsyth, Kew*!

Owing to the plant's unique resemblance to certain Phylicas, it is only by careful dissection that its affinity can be ascertained. Sonder states that the species was also gathered by Thunberg at Genadendal, a locality remarkably rich in types representative of this Order. Thunberg's descriptions are not in accord with his specimens, but Dr. O. Juel, of Upsala, has courteously informed me that the description of *Staavia globosa* Sonder tallies with specimens named *Phylica trichotoma* and *P. globosa* in *Herb. Thunberg*.

10. S. ZEYHERI Sonder, *op. cit.* 323.

COAST REGION.—Caledon-Swellendam Div.: Rocks on mountains near Appel's Kraal, Zondereinde River, *Zeyher*, 2648.

I am unacquainted with this species, and hence quote Sonder for the locality; according to him the plant is not unlike a *Phylica* or *Stilbe vestita* Berg.

X. LINCONIA

Linn. Mant. 216 (1767); Swartz in Ges. Naturf. Fr. Berl. Mag. v. 85 (1810); DC. Prod. ii. 45; Brongn. *op. cit.* 382; Sonder, *op. cit.* 317; Hooker, *op. cit.* 672; Niedenzu, *op. cit.* 135.

KEY TO SPECIES.

* Leaves linear to linear-oblong.
    Leaves 12–18 mm. long; flowers exceeding the leaves (1) *alopecuroidea.*
    Leaves 5–10 mm. long; flowers shorter than the leaves .... (2) *cuspidata.*
** Leaves ovate-oblong.
    Leaves 3–4 mm. long; flowers slightly exceeding the leaves .... (3) *thymifolia.*

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* Thunberg's specimen of *Brunia verticillata* is referable to this species, and not to *Pseudobæckea virgata* Brongn.

1. L. ALOPECUROIDEA Linn. Mant. 216; Thunb. Prod. 48; Swartz, *op. cit.* 86, t. 4, 4; DC. Prod. *l. c.*; Brongn. *op. cit.* 383, t. 37, f. 3. *L. alopecuroides* Sonder, *op. cit.* 318; Niedenzu, *l. c.*; Colozza, *op. cit.* pp. 25, 31. *L. cuspidata* Eckl. & Zeyh. Enum. 141 (not Swartz).

COAST REGION.—Caledon Div.: Caledon, *Ecklon & Zeyher*, 1083! Swellendam Div.: On the mountains near Swellendam, 2000–3000 ft., *Mund*, 19! mountain-peak near Swellendam, *Burchell*, 7316! *Pappe*, 36! *Zeyher*! *Pappe*!

WITHOUT LOCALITY.—*Fabricius*! *Masson*! *Mackrell*! *Mund*! *Forsyth*!

Linnæus's description is rather misleading, as the leaves are stated to be, *subverticillata*, 5–6; an examination of his specimen show them to be crowded, subimbricately-spreading, without forming a whorl of any description.

2. L. CUSPIDATA Swartz, *op. cit.* 284, t. 7, f. 1 (1811); DC. *l. c.*; Brongn. *op. cit.* 383; Sonder, *l. c.*; Colozza, *op. cit.* pp. 25, 32. *Diosma cuspidata* Thunb. in Hoffm. Phytog. Bl. i. 24 (1803); Prod. 28.

COAST REGION. — Stellenbosch Div.: Hottentot's Holland Mountains, *Masson*, *Herb. Brit. Mus.*, 188! Breede River, *Niven*, *Herb. Brit. Mus.*! Paarl Div.: French Hoek, 4000 ft., *Schlechter*, 9273!

WITHOUT LOCALITY.—*Kloff*! *Herb. Forsyth*!

3. L. THYMIFOLIA Swartz in Ges. Naturf. Fr. Berl. iv. 86, t. 4 (1810); Sonder, *op. cit.* 318; Eckl. & Zeyh. *op. cit.* 141; Colozza, *op. cit.* pp. 25, 32. *Diosma deusta* Thunb. in Webb & Mohr, Archiv. i. 27; Fl. Cap. 224.

COAST REGION.—Caledon Div.: Klein River, *Niven*, *Herb. Brit. Mus.*! Caledon-Swellendam Div.: Appel's Kraal, *Ecklon & Zeyher*, 1082.

WITHOUT LOCALITY.—*Masson*, *Herb. Brit. Mus.*

XI. AUDOUINIA

Brongniart in Ann. Sci. Nat. viii. 384 (1826); Sonder, *op. cit.* 323; Hooker, *op. cit.* 673; Niedenzu, *op. cit.* 134. *Pavinda* Thunb. ex Bartl. Ord. 374 (1830).

A. CAPITATA Brongn. *l. c.* t. 38, f. 1; Ecklon & Zeyher, Enum. Pl. 142; Sonder, *l. c.*; Niedenzu, *l. c.* f. 75, *o*; Colozza, *op. cit.* pp. 27, 31. *Pavinda capensis* Retz ex Steud. Nom. ed. ii. 279. *Diosma capitata* Linn. Mant. 210; Thunb. Prod. 43; Willd. Sp. Pl. i. 1136; DC. Prod. i. 717.

COAST REGION. — Cape Div.: Grassy and bushy slopes of mountains near Muizenberg and Simonstown, *Mund*, 21; *Ecklon & Zeyher*, 1085! *Wright*! *R. Brown*! *Pappe*! *Harvey*! *Wolley Dod*, 1117! *Wilms*, 3450! in stony and sandy places near Cape Point, *MacOwan*, 1459! Klein Slangkop, *Wolley Dod*, 1556! Caledon Div.: Hanglip; Hemel en Aarde, *Ecklon & Zeyher*, 1085!

Without precise Locality.—*Forbes*! *Mund*! *Zeyher*, 2653! *Rogers*! *Masson*! and in *Herb. Hooker*!

A monotypic genus of a subsocial nature, confined to the southern extremity of the Cape Peninsula and Hanglip, the latter a promontory visible on a fine day from the Simonstown Mountains across False Bay. The species marked simulation to certain Ericas has been the subject of comment by various writers.

XII. LONCHOSTOMA

Wickstr. in Akad. Vet. Handl. ii. 350 (1818); DC. Prod. xiii. i. 580 (1852); Sonder, *op. cit.* 316; Hooker, *op. cit.*, 673; Niedenzu, *op. cit.* 135. *Ptyxostoma*[*] Vahl in Danske, Nat. Selsk. Skriv. vi. 95 (1810); O. Kuntze, Rev. Gen. iii. ii. 86. *Gravenshorstia* Nees-Esenb. in Lindl. Intr. 439 (1836). *Peliotus* and *Peliotis* E. Meyer in Drège, Zwei Pfl. Doc. 80, 210, nomina. *Erasma* R. Brown in Clarke Abel, Narr. Journ. China, 374 (1816/1817), nomen.

Key to Species.

Style one; anthers hairy. Leaves more or less convex.
    Corolla 5-lobed; stamens 5 .... (1) *monostylis.*
    Corolla 4-lobed; stamens 4 .... (4) *quadrifidum.*
Styles two; anthers glabrous. Leaves flattened.
  Leaves ovate, subacute; styles longer than the corolla-tube; corolla about 1 cm. long............... (3) *acutiflorum.*
  Leaves elliptic, tipped by a prominent black apiculus; styles much shorter than the corolla-tube; corolla about ½ cm. long .... (2) *obtusiflorum.*

1. L. monostylis Sonder, *l. c.* 317. *L. monostyle* Niedenzu, *op. cit.* 132, f. 75, l–n. *L. acutiflorum* Eck. & Zeyh. *op. cit.* 142; Schnizl, Icon. t. 148, 17–18; Colozza, *op. cit.* pp. 26, 32 (not Wickst.). *Ptyxostoma monogyna* Vahl, *op. cit.* 96. *Gravenhorstia fastigiata* Nees-Esenb. *l. c.* *Peliotus detrita* and *Peliotis detrita* E. Meyer, *op. cit.* pp. 80, 210.

Coast Region.—Worcester Div.: Dutoit's Kloof, 2000–4000 ft., *Drège*! Breede River, *Coll.*? on humid rocks, Sneeuwkop, about 5600 ft., *Marloth*, 658! Stellenbosch Div.: near Stellenbosch, *Zeyher*! *Zeyher*, 3475! Hottentot's Holland Mountains, *Pappe*! Caledon Div.: Marshy places near Palmiet River, *Ecklon & Zeyher*, 1084!

Without Locality.—*Masson, Herb. Brit. Mus.*!

2. L. obtusiflorum Wickst. *op. cit.* 352, t. 10; DC. Prod. ii. 581; Sonder, *l. c.* *Passerina pentandra* Thunb. Prod. 76 (1794). *Gnidia pentandra* Thunb. Diss. fruct. 191 (1801).

Coast Region.—Bredasdorp Div.: Bokkeveld, near Eland's Kloof, *Masson, Herb. Brit. Mus.*! Central Region.—Ceres Div.: Cold Bokkeveld, Klein Vlei, 5500 ft., *Schlechter*, 10,057!

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[*] *Cf.* Verh. Int. Bot. Kongr. Wien, 242 (1906), where *Ptyxostoma*, despite its priority, is rejected.

3. L. ACUTIFLORUM Wickst. *op. cit.* 353, t. 10; DC. *op. cit.* 580; Sonder, *op. cit.* 317. *Ptyxostoma myrtoides* Vahl, *op. cit.* 97.

COAST REGION.—Tulbagh Div.: Mostert's Hoek Mountain, near Mitchell's Pass, 2700 ft., *Guthrie*, *Herb. Bolus* and *Kew*, 3233!

4. L. QUADRIFIDUM O. Kuntze, *op. cit.* 86; K. Schum. in Just, Jahresb. xxvi. i. 343 (1900). *Ptyxostoma quadrifidum* Kuntze, *l. c.*

COAST REGION.—Caledon Div.: Caledon, *Kuntze*, *Herb. Berlin.*

The species comprising the genus *Lonchostoma* depart widely from the general structural peculiarities characteristic of the Bruniaceæ in their gamopetalous corollas and epipetalous stamens, but despite this they have been allocated to the choripetalous members of the Order by general consent, nor is anatomical investigation opposed to their inclusion in this group.* Their gamopetaly is explained by various writers as due to the fusion of the staminal filaments with the claws of the petals; a not unlikely hypothesis in view of the alternation of the stamens and petals within the Order.

Endlicher and A. De Candolle assumed an affinity of this group with the monotypic *Retzia*, and accordingly placed it within the tribe Retzieæ of Solanaceæ, but this view is untenable and inconsonant with the oligospermous nature of the two-celled ovary; moreover, anatomists are fully agreed that *Retzia* is misplaced, and shows but little affinity with the Solanaceæ, and after enjoying an isolated systematic position in various groups, has at last been placed by Fedde † near *Nuxia* among the Buddleioideæ of Loganiaceæ, a position undisputed by subsequent writers.

Considerable variation is displayed by the species in the number of their ovules; I have invariably found two in each cell of *L. obtusiflorum* Wickst., eight in *L. acutiflorum* Wickst., while in *L. monostylis* Sond. the number fluctuates from six to ten. In its subsessile, hairy anthers and monostylar character the latter species deviates considerably from its allies, which led E. Meyer to propose the names *Peliotis* or *Peliotus*, but it appears inexpedient to revive these, inasmuch as in its other characters it conforms to the other members of the group, while the single style undoubtedly illustrates a case of fusion, which is evinced by the longitudinal furrows; the same character obtains in *Berzelia* and *Staavia*, and may be similarly interpreted from 2-styled forms, such as *Brunia* and *Pseudobæckea* respectively.

Niedenzu ‡ states that the anthers are hairy throughout the genus, but I have been only able to verify this for *L. monostylis* Sond. O. Kuntze describes the coralline-throat of *L. quadrifidum* as hairy. This species is particularly interesting as exhibiting a partial case of tetramery, partial in so far as the corolla and andrœcium are concerned, while the calyx is 5-fid. Complete tetramery is uncommon within the Order, but is manifested by *Berz. abrotanoides* var. *tetramera* Dümmer.

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* Solereder, Syst. Anat. Dicotyl. 658, 1899.

† Fedde, Vergl. Anat. Solan. Diss. Breslau, 1896.

‡ *Op. cit.* p. 134.

Species excluded from the Order.

Brunia cupressina Linn. = Diosma cupressina Linn.
B. imbricata Sweet = Phylica imbricata Thunb.
B. Levisanus Linn. = Leucadendron Levisanus R. Br.
B. Protea Crantz = ,, ,, ,,
B. uniflora Linn. = Diosma cupressina Linn.
Linconia peruviana Lam. = Rachicallis rupestris DC.
Raspalia angulata E. Mey. = Erica modesta Salisb.

CORRECTIONS.

P. 2, l. 5 from top, for "isolation" read insolation.
P. 12, l. 23 from top, for "Ann. Istit. Bot. di Roma" read Ann. Bot. (Pirotta).
P. 15, l. 18 from bottom, for "DC. Prod. ii. 455" (where the name is misprinted *fragarioides*) read DC. Prodr. ii. 55.

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AN ENUMERATION OF THE BRUNIACEÆ

BY

R. A. DÜMMER

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THE HISTORY OF AITON'S ‘HORTUS KEWENSIS.’

By JAMES BRITTEN, F.L.S.

The question having often been raised as to the authority for the names published in the two editions of Aiton's *Hortus Kewensis*, it may be worth while to put on record the results of notes which have been made from time to time in the National Herbarium and in that of the Royal Gardens, Kew, which contain the material on which the work was based.

The fact that neither of the Aitons wrote the botanical descriptions of the new species published in either edition is generally recognized.* There is, indeed, no reason to think that either possessed botanical (apart from horticultural) knowledge sufficient to enable them to undertake this or the bibliographical portion of the work, although, as will be seen later, the share of the younger in the preparation of ed. 2 was greater than is generally supposed. The fullest account of the elder Aiton is that by Mr. W. B. Hemsley in the *Journal of the Kew Guild* for 1902 (p. 87), and in this he is not credited with any knowledge of botany.

The editors of the two editions of the *Hortus* were Dryander (ed. 1 and part of ed. 2) and Robert Brown (for the latter part of the second edition). In the first edition (1789) Dryander utilized largely the MS. descriptions of Solander (†1782), whom he had succeeded as librarian to Banks and whose MSS. he had annotated and augmented. I propose to deal first with the share which Solander and Dryander had in the work, and then with the part which Brown took in it.

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* It may be noted however that Haworth, throughout his *Mesembryanthemum* (1794), refers to the classification and descriptions as by Aiton: "Aiton in his *Hortus Kewensis*, published 1789, described 70 species, 21 of which were new" (p. 95). In this work and in his arrangement of *Aloe* (Trans. Linn. Soc. vii. 6) Haworth gratefully acknowledges "valuable and liberal information" received from Aiton. Salisbury, who, as we shall see later, differentiated the part taken by Dryander and Solander in Hort. Kew. definitely attributes certain species to Aiton—"*Heliconia Bihai* Ait. in Hort. Kew." (Trans. Hort. Soc. i. 273); others he cites without any authority—"*Alpinia occidentalis* in Hort. Kew." (*op. cit.* 282).

SOLANDER AND DRYANDER.

The fact that Solander died in 1782 and that the first volume of the *Hortus Kewensis* did not appear until 1789 is sufficient to show that Solander had no part in preparing the book for the press. That this was the work of Dryander is clear, not only from the reference by W. T. Aiton in the second edition, to be quoted later, but from internal evidence; and to him must be assigned the preface to the volume and the list of books quoted (pp. v–xxx).* We find that Dryander was sending proofs of the *Hortus* to L'Héritier in 1788, and that the latter furnished him with diagnoses for inclusion in the volume—*e. g.* the diagnosis of *Solanum vespertilio* in Hort. Kew. i. 252 † is taken *verbatim* from his letter to Dryander of July 20, 1788, and there is ample evidence in L'Héritier's letters (in the Department of Botany) that Dryander was in frequent communication with him regarding the book, notably with reference to the *Geraniaceæ*.‡ Smith in the Supplement to Rees's *Cyclopædia* (1819) s. v. *Dryandra* speaks of Dryander's "abilities as editor of the first edition and part of the second of Mr. Aiton's *Hortus Kewensis*," § and W. T. Aiton in the postscript to vol. v., ed. 2,|| writes:—

"To the memory of his deceased friend Jonas Dryander, Esq., a melancholy tribute of acknowledgement must be paid, for having continued to the son the assistance given to his father during the publication of the former Edition of this work. This inestimable man exerted his best talents not only in improving the plan, but in arranging the materials of this Catalogue for the press, and correcting the proof sheets during the progress of the printing, until a few days previous to his death; endeavouring at the same time to instil into the mind of the Author some portion of that extensive scientific information for which he was so universally esteemed."

The facts being as stated, it is not easy to see how the tradition that Solander was responsible for the first edition came to be generally accepted. That such was the case is certain, for Bennett (who, from his association with Brown and consequent inheritance of the Banksian traditions, was of all men the most likely to know) says in his preface to vol. ii. of Brown's *Miscellaneous*

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* Aiton was quite incapable of making such a list; Dryander's connection with it is made plain by such references as those to L'Héritier (p. xxi)—the outcome of his correspondence with that botanist.

† This in *Index Kewensis* is cited as of Aiton, but as L'Héritier's name is therein attached to the diagnosis, it would seem that he should be cited as the authority.

‡ See Journ. Bot. 1905, 267–271.

§ The note continues: "As well as of Dr. Roxburgh's Plants of Coromandel"; the reference would be to vols. i. and ii.; the third, published in 1819, was under the "general superintendence" of Brown (Misc. Works, ii. pref.). The earlier volumes contain no evidence that Dryander acted towards them in an editorial capacity.

|| This follows p. 530 and precedes the Index, and is thus liable to be overlooked.

Works that Brown, "after the death of Dryander in 1810, bestowed [on the second edition] the same attention which had been devoted by Dryander to the earlier portion *and by Solander to the first edition.*" It was no doubt from Bennett that Asa Gray derived the impression that "it is hardly proper that either the elder or the younger Aiton should be quoted for these species, since the first edition was prepared by Solander and the second revised by Dryander as to vols. 1 and 2, and the remainder by Mr. Brown." (Amer. Journ. Sci. xl. 10 (1841).)

But, although he was in no way concerned in its publication, the first edition of the *Hortus* was largely indebted to Solander's work as preserved in the MSS. connected with the Banksian herbarium already referred to; and Stokes's statement that his "observations enrichd the first edit. of Hort. Kew. with specific characters and descriptions" * is strictly accurate. Another note from Stokes's very interesting volume shows even more definitely Solander's relation to the *Hortus*:—"Aiton the father . . . explained to me the plan of the Catalogue which appeared some years after under the title of Hort. Kew. Aiton carried his specimens and doubts to Banks's library as I did those of the Upton garden, where they were examined and resolved by the polite and candid Solander, as his manuscript descriptions and specific characters in the British Museum will testify." † Smith, in his memoir of Solander,‡ says it was he "who reduced our garden plants to order and laid the foundations of the *Hortus Kewensis*"; but he in no way suggests Solander's connection with its production.

The contemporary best acquainted with the MSS. mentioned was R. A. Salisbury, whose reference to them may be quoted: "Solander's manuscript determinations of genera and species, some of which have been published in the first edition of *Hortus Kewensis*, are the only evidence by which [we] can give our verdict respecting his abilities, for he died in 1782; but great as they unquestionably were, and putting all Dryander's verbal communications out of the question, the latter has left abundant proofs, *often on the very same papers*, of being a superior botanist." § The words italicized show that Salisbury was familiar with the MSS., which indeed must be regarded as a joint production of the two botanists, whose handwritings are often combined in the same description—one having written the first draft which the other has added to or corrected.

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* *Botanical Commentaries* (1830), p. cxxvi.

† *Op. cit.* cxviii.

‡ *Correspondence of Linnæus*, ii. 3.

§ *Liriogamæ*, 8. The relative merits of Dryander and Solander need not here be discussed, but Salisbury, who was on terms of intimacy with Dryander who visited him at Chapel Allerton in 1789 (*op. cit.* 22), elsewhere contrasted them to the credit of the former: "Solander preferred dried specimens that he might not use characters liable to disappear in an herbarium; Dryander on the contrary never trusted to a dried plant if he could see it living" (*op. cit.* 128). Salisbury's statement (p. 8) that Smith in the Supplement to Rees "made an invidious comparison between [Dryander] and Solander, which must not go down to posterity uncorrected" is inaccurate: no such comparison is made by Smith, whose notice of Dryander is warmly eulogistic.

It was doubtless his knowledge of the MSS., perhaps with the help of information derived from Dryander personally,* which enabled Salisbury in his *Prodromus* (1796) and elsewhere—*e. g.* in Trans. Hort. Soc. i. 264–366—to add the name of Solander or Dryander to the names of the species first published in Hort. Kew. So far as I have tested these, the attributions are accurate †; and they have been generally followed in the *Index Kewensis*. An examination of the MSS. would doubtless enable this to be done in a large majority of cases, as it was for *Crassula* in a paper by Mr. E. G. Baker and myself published in Journ. Bot. 1897, pp. 481-484.‡

It may be noted that the authorship of certain of the names in the *Hortus* has been generally recognized or even claimed by the authors themselves; of the latter *Begonia humilis* may be cited as an instance. Dryander, in his "Observations" on the genus (Trans. Linn. Soc. i. 155–173), although he merely appends to this "Hort. Kew. iii. 353"—he seems to have been the most modest of men—says in his note upon it "I gave it the trivial name of *humilis* in the *Hortus Kewensis*" (p. 167). It does not seem, however, that there is sufficient justification for attributing species to authors who are not responsible for their publication: the Rule that "it is necessary to quote the author who *first published* the name" is definite and precise. They cannot be cited as of "Solander in Ait." or even as "Solander ex Ait.," for Solander's name is nowhere quoted in the *Hortus*; the earliest date at which the species are attributed to him is 1796, by Salisbury, as already mentioned; to cite, as the *Index Kewensis* does, "[Sol. in] Ait." is to import unpublished information into the matter; and the same must be said as to the claims of Dryander, although he edited the first edition. "Ait." must stand as the authority for this, except where special information is given, and "Ait. f." for the second edition.

It may be worth while to adduce one or two examples of the doubts which must arise when information other than that afforded by the published work itself is relied upon as evidence of authorship. *Smithia* was, according to Smith, whom it commemorates,§ "named by Mr. Dryander in the *Hortus Kewensis* of our mutual friend Aiton" (iii. 496, 512), and the type specimens in the Banksian Herbarium are named by Dryander. Salisbury, however, although in his *Prodromus* (p. 342, 1796) he cites the name as of Dryander, has a long Latin note in the description of the plant in his *Paradisus* (t. 92, 1808), in which he claims the name, adding in English: "I had the honour of naming the genus in the *Hortus Kewensis*. . . Mr. Dryander permitted this child of pure friendship and solid merit to pass for his until the real father owned it."

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* That Salisbury had the help of Dryander in his *Prodromus* will be seen from pp. 294, 297, 324 of that work.

† This remark does not apply to citations of other authorities—*e. g.* "Buddlea salvifolia Banks," "Pitcairnia bromeliæflora Garden": the Solander-Dryander MSS. do not confirm these attributions.

‡ The statements therein made (p. 481) as to the authorship of the *Hortus Kewensis* are amplified in the present paper.

§ *Introduction to Botany*, 378 (1807).

Strelitzia (Hort. Kew. i. 285, iii. 508) is generally recognized as having been named by Banks. "Previous to the publication of the *Hortus Kewensis*," says Curtis (Bot. Mag. 119), "he made a new genus of this plant . . . and named it *Strelitzia* in honour of our most gracious Queen Charlotte, coloured engravings of which, executed under his direction, he presented to his particular friends." This was Sowerby's plate, subsequently reproduced in Hort. Kew. Smith in Rees (s. v.) says it was "named by Sir Joseph Banks and the late Mr. Aiton." The full description of the genus, however, printed in Hort. Kew. iii. 508, is taken *verbatim* from the MSS. of Dryander.* It does not thus appear that Banks's name can be associated with the publication of the genus, for the private distribution of an engraving does not constitute publication; and *Strelitzia*, in common with *Smithia*, must be cited as of "Ait."

It should not however be overlooked, as it sometimes is, that certain descriptions in ed. 2 as in ed. 1 are signed by their writers, and that in such cases they are the authority for the names of the species described. This is generally recognized with regard to the species noted as of "Brown MSS." in ed. 2, but not as to other contributors to ed. 1. The genus *Amaryllis*, for example, was contributed by the younger Linnæus, and his name is attached to each description; but the *Index Kewensis*, which is careful to give credit to Solander for descriptions with the publication of which he is in no way associated, quotes *A. equestris*, *A. ornata*, and *A. purpurea* as of "Ait. Hort. Kew.," whereas the citation should run "Linn. f. in (or ex) Ait. Hort. Kew." The same statement applies to various other names in the Monocotyledons—e. g. *Hæmanthus toxicarius*, *Crinum erubescens*, *Cyrtanthus obliquus*—first published here, the younger Linnæus having appended his name to most of the descriptions in the genera in which these occur. The treatment of each of these names in *Index Kewensis* is different, though their position is identical: the first stands as of "Linn. f. ex Ait.," the second as of "[Soland. in] Ait." and the third as "Ait." In the same way as these of Linn. f. should be quoted certain names attributed to L'Héritier and taken by Dryander from his letters— e.g. *Comptonia*, as to which see Journ. Bot. 1909, 45; this should be cited as "L'Hérit. ex Ait." A careful examination of the *Hortus* would no doubt result in the discovery of similar instances.

It may be interesting to add transcripts of two letters that passed between W. T. Aiton and Dryander with regard to the second edition, which are preserved in the Department of Botany, at the end of the volume of Dryander's correspondence. Dryander's reply is the draft in his own hand—not dated—retained by him of the letter actually sent:—

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* It may be worth while to call attention to the beautiful and extensive series of drawings of *S. Augusta*, *S. Reginæ*, *S. parvifolia* and *S. ovata*, made by Francis Bauer at Kew and preserved in the Department of Botany, where are also Masson's drawings of the first-named, which he discovered at the Cape.

"My dear Sir,

"In a conversation I had lately with Sir Joseph Banks, he was pleased to introduce the Subject so near to me as the Kew Catalogue & in the most kind Terms possible, gave me his decided approbation of publishing a second Edition—at the same time Sir Joseph was so condescending to me as to hint, in the most agreeable Manner, a strong Hope it would have your invaluable concurrence, these kind Intimations have open'd to me the opportunity of submitting the subject of conversation to your consideration, & approval. The Inference I have drawn from many proofs of your good disposition towards me has given me a silent confidence I may not be finally disappointed of a friendship so truly desirable—if the only point between us could rest upon the Terms of publishing *Hortus Kewensis*, at once I shall agree to any you may think proper—but judging your finer feelings by my own, I shall take upon myself to offer one Proposal, namely, that the Profit of the Edition may be divided equally between us, share and share alike, & to forward the Bookseller coming to Acct. I should think it no inconvenience to pay all Bills for paper & printing before the Work is Publish'd—beleive me D^{r}. Sir with very sincere regard

"Your Most Obedt. Servt.

"Royal Gardens Kew
25 April 1803."

W. T. AITON."

"D^{r}. Sir,

"I would have answered your letter sooner, if an accident had not happened, which has given me more vexation than it was worth, and made me unfit for writing. I shall be very ready to give you all the assistance in my power in publishing a new edition of Hrt. K. without any particular view to pecuniary considerations, which have always had perhaps too little influence in my way of thinking. But before we proceed to put it in execution it will be necessary to have a conference with Sir Joseph Banks, to determine upon what alterations the edition of Willdenow's Species Plantarum and other new books may make expedient particularly in regard to synonyms and differentiæ specificæ, and also on what is most proper to be done in regard to the adoption of new genera cut out of the old ones, and to the placing of some of the old genera, which have of late been thrust from one class into another, so as to steer clear between too close adherence to old errors, and too great readiness to adopt all new whims. I should think it best to wait till Sir Joseph comes to Spirogyriæ, when he is more likely to have some leasure for attending to this business, and I will in the mean time put down in writing some memorandums of the points which I wish to have settled, before I seriously go to work. At the same time I must observe, that, as I have for the last six or seven years very little attended to Botany, I am not au courant, as the french call it, of all what has been published in that time, and therefore not so able, as I might formerly have been, to say what is new and not new; besides age has already had that effect on my memory, that what I now read does not so easily turn to profit, when it is wanted, as the information I got in my younger days."

ROBERT BROWN.

The practical importance of the question of citation arises chiefly in connection with the monograph of the *Cruciferæ* ("Tetradynamia"), in which *Cleome* is included in the second edition (iv. 72–133). It has always been common knowledge that this monograph was the work of Robert Brown, and the numerous genera and species therein established have always been attributed to him, both by his contemporaries and by recent writers. But it has from time to time been pointed out that in the book itself Brown's name is in no way associated with the *Cruciferæ*, either in the monograph itself or in the postscript which is placed between the conclusion of the text and the index in the fifth volume. This is the more remarkable in that his genera and species in the *Leguminosæ* (iii. 1–22; iv. 266–338; v. 460–468), *Myrtaceæ* (iv. 410–419), *Compositæ* (iv. & v. in various places), and *Orchidaceæ* (v. 188–222) are always indicated by the prefix "Brown MSS." But it is not easy to see how, consistently with Article 40 of the Vienna Code, Brown's name can be attached to the genera and species of *Cruciferæ*.

The Article, which is practically a repetition of that in the De Candollean 'Lois,' runs:—"For the indication of the name or names of a group to be accurate and complete, and in order that the date may be readily verified, it is necessary to quote the author who first published the name or combination of names in question." Not only did Brown himself not publish the names, but, with rare exceptions—e. g. *Cleome Houstoni**—he did not write them on the sheets of the Banksian Herbarium on which he worked, nor do they appear, save rarely, in his MSS. on the *Cruciferæ*; moreover, the descriptions in these MSS. do not tally with, though they do not contradict, the published descriptions.

The case against their attribution to Brown was put so clearly by the Messrs. Groves in the course of a discussion on nomenclature which appeared in this Journal for 1882, that I cannot do better than cite it:—

> "We think that perhaps the most flagrant instance of the evil of quoting other than the publisher as the authority, is that of Robert Brown and Aiton's *Hortus Kewensis*. . . . Here we have a book, stated on the title-page as 'By the late William Aiton; the second edition, enlarged by William Townsend Aiton'; and from this book we are asked to quote, among others, '*Mathiola*, R. Br.' although there is no mention whatever, under that genus, that Robert Brown had anything to do with the name. We have been told that 'everybody knows' that Robert Brown described *Mathiola* and the other things, but how does 'everybody know' in the absence of evidence in the work itself? If we are to go beyond the evidence in a book, as to the authorship of species therein described, where are we to stop? as Robert Brown is not the only instance of one man doing the work and another taking the credit; and to be consistent, if it should be discovered, at a future time, that another than the one whose name appears to a book, had described species therein, it would be necessary to alter the authority, and this would do away with the certainty of the authority for every name" (p. 107).

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* *Cleome* was included in the *Tetradynamia* in Hort. Kew.

To this I replied:—

> "The difficulty of deciding what names were published by Mr. Brown in the *Hortus Kewensis* is to a very great extent removed by the republication, in the *Miscellaneous Works of Robert Brown*, of all his contributions to that work. The *Miscellaneous Works* were collected and edited by Mr. Brown's colleague, Mr. J. J. Bennett, who was of course well acquainted with the part Mr. Brown had taken in the *Hortus Kewensis.* Sprengel (1818) uses the name *Mathiola*, altering the spelling to *Matthiola*, and quoting it as 'R. Brown emend.'; A. P. De Candolle (Syst. Nat. ii. 162, 1821), retaining the original spelling, attributes the genus to Brown, as every one has since done. The fact, therefore, of Mr. Brown's connection with the name is obvious enough; and it was fully recognized by his contemporaries" (p. 108).

It may be well to show that Brown himself referred to the *Cruciferæ* as his own work, and to adduce further evidence that it was so regarded by his contemporaries. In his Appendix to Denham and Clapperton's *Narrative of Travels in Northern and Central Africa* (1827) Brown devotes considerable space (pp. 210–220) to remarks on the structure of the order, in the course of which he revises an opinion which "I carried further than I am at present disposed to do in the second edition of Mr. Aiton's 'Hortus Kewensis'" (p. 211); says of *Koniga*, which he is then founding, "In the second edition of Hortus Kewensis I included this plant in *Alyssum*" (p. 214); and (p. 215), "I first introduced [the] adhesion of the funiculi to the septum, as a generic character, in distinguishing *Petrocallis* from *Draba*" (*i. e.* in Hort. Kew. ed. 2, iv. 93). Brown throughout this portion of his paper refers to A. P. De Candolle's monograph of the order in Syst. Nat. ii. (1821); "Brown in Hort. Kew. ed. 2, v. 4, p. 71" stands at the head of this, among the works cited, and is quoted throughout in this manner under genera and species, as well as in the introductory remarks (p. 145).* An even earlier reference is that by Smith in Rees's *Cyclopædia*, xxxv. (1817) under "Tetradynamia": "The best attempt to reform them has lately been made by Mr. R. Brown, in the second edition of Mr. Aiton's *Hortus Kewensis*." The whole order was reprinted textually in Nees von Esenbeck's German edition of Brown's collected works† (vol. v. pp. 1–7; 1834).

It must also be remembered that W. T. Aiton expressly states that all Brown's contributions were not indicated: his acknowledgement in the Postscript runs:—"To Robert Brown Esq. most learned in the practical knowledge of Botany, and in the very refined and scientific parts of it in particular, with a mind comprehensive and acute, and with friendship equally liberal to the Author, must be attributed the improved state of the latter volumes of this Work. Much new matter has been added by this gentleman, and *some without reference to his name;* but the greater part of his able improvements are distinguished by the signature of *Brown MSS*." To this must be added Bennett's statement,* that "on that portion" of the work printed after the death of Dryander in 1810 [Oct. 19] [Brown] "bestowed the same attention which had been devoted by Dryander to the earlier portion, and by Solander to the first edition, adding largely to the elucidation of certain Families and Genera." Heward, writing in Hooker's *Journal of Botany* in 1842, refers to Brown as "superintending the progress of the latter volumes through the press." It seems likely that Brown communicated to Bennett, so many years his colleague in the British Museum, information which enabled the latter to include in the *Miscellaneous Works* the "Genera et Species Plantarum e variis Familiis . . . extracted from *Hortus Kewensis*, 2nd edition, vol. III, IV & V," which occupy pp. 503–510 of the second volume; and this entry seems to indicate the volumes (dated respectively 1811, 1812, 1813) which Brown "saw through the press." Pritzel (ed. 1) is somewhat more precise: he says that Brown "curavit editionem alteram Horti Kewensis a classe xii ad xxiv," *i. e.* from vol. iii. p. 175 onwards. Brown's name is appended in the *Hortus* to two only of the new names claimed for him by Bennett, and the Herbarium does not confirm this claim—indeed, in one case it implicitly denies it, for *Stemodia parviflora*, which Bennett includes among the plants "e variis familiis," attributed to Brown, is written up by Bennett himself in the Herbarium as "*Stemodia parviflora* Sol." The MSS. offer no evidence, as it is described neither in Brown's nor in Solander's. That at least one name of Brown's now accepted was adopted in consequence of verbal communication is shown by a note by A. P. De Candolle in Syst. Nat. ii. 435, where the name *Chorispora* is substituted for *Chorisperma*, with the remark: "*Chorispori* nomen ob nimiam cum *Corispermo* similitudinem ipse mutavit cl. Brown, ut me monuit in colloquio."

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* See p. 9 for another reference by De Candolle.

† *Robert Brown's Vermischte Botanische Schriften:* Nürmberg, 1825–34.

The foregoing evidence is, I think, sufficient answer to Messrs. Groves's question—"How does 'everybody know' that Robert Brown described *Mathiola* in the absence of evidence in the work itself?" but it of course in no way excludes the application of the Article which says "it is necessary to quote the author who first published." It can hardly be suggested that they should be cited as of W. T. Aiton; but they cannot be quoted as "R. Br. et (or apud) Aiton," for they were not referred by the publisher to their author, as Article 42 requires in the case of such citations and also when "in" is used in place of "ex" or "apud." Yet "in Ait. Hort. Kew." is in accordance with the facts of the case, and under the special circumstances it may be suggested that in the particular instance of the *Cruciferæ* an exception should be made to the Rule, and that the citation "R. Br. in Hort. Kew. 2," which has been in general use from 1821 (DC. Syst. Nat.) and is maintained in the *Index Kewensis*, should be recognized as legitimate. Some such exception seems hinted at by Asa Gray in this Journal for 1882

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* Pref. to Miscell. Bot. Works, ii. vi.

(p. 174), where, having pointed out that "the first edition of the *Hortus Kewensis* is properly cited as Ait. Hort. Kew." he says: "It would equally govern the well-known contributions of Robert Brown to the second edition of the *Hortus Kewensis*, notwithstanding their posthumous collection in Brown's works, except for their early and general recognition as Brown's (doubtless at his own instance) in standard systematic works."

I do not think, however, that the names "e variis familiis" in the *Miscellaneous Works* would be necessarily included in this exception, although these too seem to have been generally recognized as of Brown—e. g. *Anisomeles ovata** was so quoted at least as far back as Sprengel, Syst. ii. 706 (1825).

It may be of interest to append here copies of three letters preserved in the Brown Correspondence in the Department of Botany which throw some light upon the relations between W. T. Aiton and Brown and upon the share of the latter in the *Hortus*. Unfortunately Aiton does not supply the information asked for by Brown as to where Dryander "probably stop'd," but it is clear that Brown, if he carried out his intention, contributed no new matter "after *Gynandria*"—*i. e.* after p. 228 of vol. v.—except of course the description of *Trichomanes brevisetum*, to which "Brown MSS." is appended. Aiton's wish to connect Banks with the Chili Pine is carried out on p. 412, where it is called "Sir Joseph Banks's Pine."

"My Very Dear Sir,

"Accompanying this letter, I send you the residue of the MSS. of Hortus Kewensis, which I most humbly submit to your review and correction, the importance of which I shall now and ever hold up as of the utmost value to me in life.

"The duty we owe to ourselves & others, your kind intention to visit your aged parent in the North during this summer, the sad invalid state of my present health also, which will require that I remove in the Autumn to Cheltenham for the benefit of the waters, altogether make it necessary that I bring to a point and finish the Kew Catalogue for publication, & as I have made up my mind, & indeed a very anxious one it is upon this subject, I determine not to leave Town until I have set my house in order, so I entreat the favour, as soon as your learned head & hand have passed the Mss. for press, that you will allow me to withdraw the outstanding copy now before you, & that the whole may be returned to my immediate direction for publication, the difficulty of which I am relieved from viewing seriously, by the confidence I have in my own zeal, some little experience I have had at the printing office, & the printer's, Mr. Taylor's, ready offer & assurance I shall have allotted me a skilful & correct reader during printing off the work, having submitted to you these particular points I am flattered that I shall be able to proceed with two or more sheets a week, without any stop to my little book, which has advanced considerably to my satisfaction.

"Your friendly & frank heart will allow me to open mine on this occasion, without reserve, & therefore bow with confidence that you will put your finishing hand to the Synonymy of the work, which I beg you will add to, or subtract from, as you may think proper, before you leave town for the North. Above all, I desire, if I may use the word desire, that you will be pleased when you make up & pass the pine tribe that the favoured plant of Chili may become a testimony of submission in honour of our most exalted friend of Flora, Sir Joseph Banks, in the shape & form referred to, when I had the pleasure to receive your visit at Kensington, beyond which, let me beg to request & protest against any further introduction of new matter within the work of Hort. Kew. excepting my own additions in acknowledgement of gratitude & devotion to the venerable Baronet himself, to my ever to be lamented friend Mr. Dryander, & to Yourself for the Mercies I have received & which never will be forgotten.

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* This, the *Nepeta indica* of L. Sp. Pl. 571, should take the name *Anisomeles indica*.

"My Dear Sir,
Yours ever,
W. T. AITON."

"Royal Gardens, Kew,
8 July, 1813."

"To Mr. Aiton in answer to
his of the 8th instant.

"Soho Sq.,
July 10, 1813.

"My Dear Sir,

"I have received the remainder of the Copy of Hort. Kew. (the Ferns excepted) and with it your letter, from which I am truly concerned to find you continue so unwell.

"I regret exceedingly that in such a state of health you should voluntarily and as it appears to me without material advantage impose upon yourself a task which must at least be troublesome in so much as it necessarily requires a certain portion of time and attention. I hope however as you have made up your mind on the subject you will be more successful with the Printer than I have in general been. On this particular matter I feel it necessary for me most distinctly to state to you that the printing of H. K. no delay has originated with me since the Mss. of Gynandria was prepared & sent in to the Printer, if anything to the contrary has been stated to you by any one in few words it is not the truth.

"I shall as you desire it continue to examine and where necessary to alter or expunge from the additional matter, but as to what has had Mr. Dryander's sanction it had better be left unaltered; have the goodness therefore to inform me where he probably stop'd, and as soon as convenient send the rest of the Mss.

"You shall have no reason to complain of the insertion of new matter in that part of the copy still unprinted. You will find no trace of me in this respect subsequent to Gynandria. The little I had done in the Pine tribe, which has not been, nor should it have been, the cause of a moment's delay, I have withdrawn along with some other little matters in conformity with your interdiction.

"As to connecting Sir Joseph Banks name with the Chili Pine. I am really quite at a loss to know how to manage it and tho' I will remember your wishes on the subject yet I have no recollection that any thing was determined upon and at present can only suggest that it might perhaps be done in the English name, the Mss. however is left unaltered.

"Have the goodness to send on Monday Morning or as soon after that as you please for the first portion of copy, I have what will be equal to several sheets quite ready for you and it cannot be long before the whole is completed; at any rate depend upon it no delay shall originate with me and you may forthwith commence printing at any rate you please or rather at any rate the Printer may find convenient. On your own part there can be no difficulty except perhaps on the article of punctuation, the Linnean mode, adopted in the specific characters, is not very readily understood, and certainly not at all by Willdenow; such as it is however it has been carefully attended to both by Mr. Dryander and myself. If you do not feel quite satisfied in being able to manage this I will either endeavour to explain it to you as well as I am able or in any doubtful case which you may point out, am of course ready to give my assistance.

"Permit me my Dear Sir to conclude this long letter by assuring you that if any circumstance should interfere with your present plan, or if, which I trust will not happen, the state of your health should render it advisable for you to go to Cheltenham sooner than you at present intend you will find me perfectly ready and at the shortest notice to resume my function in so far as correcting the press is concerned. Thus even my Scotch journey, which is not yet determined upon would not materially interfere with as I dare say I could have the proofs sent to me.

"With best Compliments to the Ladies and sincerest wishes for your speedy recovery,

"I remain, My Dear Sir,
Very truly and affectionately yours,
R. Brown."

"My Dear Sir,

"I am favoured with your kind & cordial letter, it has affected my heart with gratitude & demands my warmest thanks.

"I am afraid I expressed myself in too many words, when I open'd my design upon the pine of Chili, all my object upon this subject has been, that this very superb tree, the food of Nations, may be erected through its english name into a living & lasting monument of respect to Sir Joseph Banks. I was most certainly very ill when I committed myself to you upon this & other points, & altho I now find I am a little better I do not warrant myself sufficiently so, to attend upon you to-morrow evening, do therefore allow that our meeting in Soho Square may stand over till to-morrow sennight when, if I go on well I trust I shall be able to offer you my regards with more cheerful confidence than I am at present able to do, in the meantime I pray you will feed the press, & allow me to request you will keep in your possession till after our next meeting all the remaining copy, to which your letter refers as I am sincerely aware I have much to learn, before I presume to receive from your hands for the press, the unprinted part of Hort. Kew.

"Believe me Dr. Sir with great regard,
Ever Yours most truly,
"Kew, 13 July, 1813." W. T. Aiton."

The actual preparation of the second edition for press was the work of Richard Cunningham, who was employed by W. T. Aiton as his amanuensis from 1808 to 1832. A portion of the MS. (ii. 332 to end, iii. to p. 362) was acquired by the Kew Herbarium Library in 1881; this is in R. Cunningham's hand, and consists of a transcript of the first edition with numerous additions, with intercalated slips of further additions transcribed probably by a clerk under Dryander's direction. The MS. appears to be that which was actually sent to the printer; the occasional discrepancies between it and the printed copy—*e. g.* in the limitations of *Cucubalus* and *Silene*—may be accounted for by the supposition that these represent corrections in proof. Occasional interlineations by Dryander show that the MS. passed through his hands, and there are numerous additions as to the introducers of certain plants in the hand of W. T. Aiton. It appears to be an accidental survival from the destruction of W. T. Aiton's MSS. and correspondence, which, as will be seen later, took place in 1849. The date at which occurred the hitch referred to in the foregoing letters may be ascertained from a volume of notes concerning ed. 2 of the *Hortus*, mostly in the hand of Richard Cunningham, which was received at Kew with the volume just noticed. It is clear, however, that W. T. Aiton's share in the preparation of this edition was much greater than has been supposed. In the "Record-Book" of the Gardens for 1793–1809, preserved in the Kew Herbarium (pp. 295–399) is a series of additions and corrections to the first edition in his hand which show a very considerable knowledge both of plants and of botanical literature: these were evidently prepared for the use of Cunningham, who has occasionally added notes on identifications.

THE 'EPITOME' OF THE HORTUS KEWENSIS.

It may be well to add to this history of the *Hortus Kewensis* some account of the *Epitome* (1814) to which the "account of the proofs and revises received from Mr. Taylor" on pp. 187–9 of the volume of notes just mentioned refers, and which seems to have been entirely the work of Richard Cunningham. The proofs were delivered at short and regular intervals until Jan. 7, 1813, when sheet 2 K (pp. 249-256) was received. This carried the *Epitome* to the end of vol. iv. of the *Hortus*; the following sheet was not received until Sept. 9, the intermission being accounted for by the delay in the production of vol. v.

With regard to the *Epitome*, I do not find it anywhere noticed that there are two editions—issued in the same year, but differing in important particulars. The first contains 330 pages, besides an Index Generum, an Index Synonymorum, an English index, and 14 pages of addenda, none of which are paged. The information as to each plant is given in five columns, headed respectively "Linnæan Name," "English Name," "Native Soil," "Cult." (*i. e.* date of introduction), and "Time of Flowering." The second corresponds with this in the above details, but the number of columns is six; between the second and third of the preceding is interpolated one headed "figure," which is thus explained in the paragraph added in this issue to the "explanation of the abbreviations used in this work":—

"The third column contains references to figures; those in *Italics* distinguish the works in which the plants are published under the same name as in Hortus Kewensis; but such as are printed in Roman letters denote that the plants so quoted will be found under other names in the several books to which they are referred."

Two explanations are added—"in p. 7. Most part of the year" and "i, ii, iii, iv. January, February, March, April." These numerals are in the second edition substituted for the names of the months, and the substitution has, with a reduction of the margin, allowed room for the addition of the new column.

The absolute identity of the contents of the pages in the two editions, and the fact that the "addenda" are not incorporated, lead me to the conclusion that the same setting of type was used for both issues. The titlepage of the second was reset, and bears the addition "with references to the figures of the plants," and a "list of books quoted" (pp. v–xi) is prefixed; the paging is continuous to the end of the addenda, thus reaching p. 374.

The volume of notes by Richard Cunningham to which reference has already been made makes the history of the two issues clear, for it includes lists of the dates at which he received the proof-sheets of each. The first (pp. 187–9), contains, as has been said, those of the first issue, which run regularly from Oct. 24, 1812, until Jan. 7, 1813; then, after the gap already explained, from Sept. 9 to Oct. 28 of the same year. On pp. 257–8 is a similar list headed "Figured Index H. K."; the dates of this run from May, 1813, to Oct. 18 of the same year.

The conclusion at which I arrive is that the first issue was considered unsatisfactory, and that it was decided to supersede it by a more complete version. It is not quite easy to understand why, if this were so, the superseded version was carried to completion, for it will be observed that, not only do the dates of the latter portion overlap, but that the revised version was actually completed before the original—the respective dates being Oct. 28 and Oct. 18. But the view as to its supersession is supported by the fact that the first issue is evidently rare—the only copy I have seen is that in the Kew Herbarium library. Neither Pritzel nor Dr. Jackson refer to more than one impression—doubtless the second, to which all the copies I have seen, including those in the British Museum Library, in the Department of Botany, and in the library of the Linnean Society, belong.

In the *Garden* for Jan. 24, 1880, John Smith, who was connected with the Royal Gardens from 1822 until his resignation of the Curatorship in 1864 and who was personally acquainted with the Aitons and the history of the Gardens, published an account of a proposed second edition, with other particulars. The account also contains other information of interest, and may fitly be transcribed here. After referring to the *Epitome* published in 1814, Smith continues:—

> "In the years following numerous new plants continued to be added to the garden collection, which, after the names were correctly certified, were entered in their respective places in an interleaved copy of the *Epitome*, it being Mr. Aiton's intention to publish a second edition of that work, and specimens of the new plants were preserved as a record of their having been grown in the gardens, and, as further evidence of such, Mr. Aiton in 1822 began to have drawings made of the new and unfigured plants then in the garden. His first artist was Thomas Duncanson (a young gardener from the Royal Botanic Garden, Edinburgh), who had a talent for drawing plants; and Mr. Aiton, finding him qualified to draw the plants sufficiently accurate for them to be identified, in time he was entirely occupied in drawing, which he continued to do

until the summer of 1826, when he unfortunately became insane, and was taken charge of by his father, then gardener at Gosford, in East Lothian. He was succeeded by George Bond, then a young gardener at Kew, who was employed in drawing for nine years, when (in 1835) he became gardener to the Earl of Powis, at Walcot, where he now is. In consequence of the time of Mr. Aiton (between 1820–30) being much engaged by George IV., at Windsor, the selection of subjects to keep the artist employed rested with his amanuensis, Richard Cunningham, and myself. Mr. Aiton, however, took every opportunity of going round the garden and pointing out subjects for drawing. The number of subjects drawn by these two artists amount to about 2000, of which about 1700 were drawn by Mr. Bond. Mr. Aiton, being anxious to get the *Epitome* ready for publication, and his duties at Windsor preventing him doing much to it during the day, he, in the winter evenings of 1826, 1827, and 1828, spent several hours in his garden office with Richard Cunningham and a young gardener as copyist. In 1830 the *Epitome* was ready for publication; but the death of George IV., and changes made in the establishment by William IV., led Mr. Aiton to delay his publication, and to ultimately abandon it. On Mr. Aiton's retirement in 1841, his garden library, record plant-books, papers, and drawings, were removed to his own house, and on his death in 1849, the whole of his immense correspondence was burnt by his brother, John Aiton; the drawings and plant-record books were, however, spared. Some time after John Aiton's death, Mr. Attwell Smith,* Mr. Aiton's heir, was pleased to return them, directed to the care of Sir. W. Hooker; the drawings† are now amalgamated with the large collection of drawings and prints early commenced by Sir W. Hooker, and now yearly added to by Sir Joseph Hooker. With regard to the manuscript copy of the *Epitome*, as I could never hear anything of it, I suppose it to have been burnt, so that if it were not for the figures in the *Botanical Magazine* made from Kew plants, and a collection of specimens made by me (now in the British Museum), and also the drawings of Duncanson and Bond, and some lists which I have, little would be known of the new plants introduced after 1814."

The Hortus Kewensis and the Banksian Herbarium.

The present seems a suitable opportunity for defining the intimate relations which existed between the *Hortus Kewensis* and the Banksian Herbarium. Lasègue's reference—"Un herbier composé des plantes cultivées au jardin royal de Kew et décrites dans l'*Hortus Kewensis* se trouve dans la collection particulière d'Aiton, qui fait partie des herbiers de sir Joseph Banks" ‡—is misleading, for Aiton did not possess a herbarium, it being his custom, as has been already stated, § to "carry his specimens and doubts to Banks's library, where they were examined and resolved" by Solander. We have in the Department of Botany the day-book of the plants sent by Aiton from Kew and by others from various gardens to Solander and Dryander for names. The Kew entries, which are by far the most numerous, extend from April, 1777, to July, 1797; the early portion is mostly in Solander's hand, the remainder in Dryander's,* the notes attached to the names, many of which are followed by "MSS.," are often of interest, containing notes on habit, queries addressed to Aiton, &c. On the first page is the entry: "*Vaccinium fuscatum* MSS. This was described 1774 from specimens from Kew Garden." A reference to the MSS. shows the description in Solander's hand, with the note "floruit in Horto Kewensi ad finem Maji 1774" and in the Banksian Herbarium we find the specimen named in Solander's hand and endorsed by him "Hort. Kew.—74." †

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* He was a natural son of William Aiton: see Journ. Bot. 1884, 122, footnote. The Kew Garden record-books there referred to, which are now in the Kew Herbarium library, contain much matter of interest.

† A MS. list by Richard Cunningham of the drawings of Bond and Duncanson is in the Kew Herbarium Library; the drawings may be distinguished in the general collection of drawings by the initials "B" and "D" on each respectively.

‡ *Musée Botanique*, p. 323.

§ *ante*, p. 3.

It has been supposed that this Herbarium is typical only for plants actually grown in Kew Gardens, but those from the other gardens entered in the day-book are also included in it, whether grown at Kew or not. The title *Hortus Kewensis* is perhaps somewhat misleading, for the book, as Stokes remarks, contains plants "cultivated in Kew Chelsea Upton and Islington gardens," and "perhaps ought rather to have been stiled Hort. londinensis." ‡ A typical instance may be cited—that of *Ancistrum lucidum*, which is stated in Hort. Kew. i. 16, to have been "introduced by John Fothergill, M.D." A reference to the MS. description in the Solander-Dryander MSS. shows that the date 1777 should have been 1779—the entry is "Floruit in Horto D. D. Fothergill ad Upton, Majo 1779"; and a reference to the day-book shows that it was brought from that garden § on May 20 of that year. The entries in the MSS. and the descriptions published in Hort. Kew. admirably illustrate the intimate collaboration of Solander and Dryander: the entry "*Ancistrum lucidum* MSS." in the day-book is in Solander's hand, and so is the diagnosis in the MSS., subsequently published in Hort. Kew.; but in these MSS. the name and locality are written by Dryander, as is also the detailed description published in the *Hortus*.

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* A few entries and one or two lists (pp. 10, 42, 61, 62, 85) are written by Bacstrom (see Journ. Bot. 1911, 92), and there are pencil entries by Banks on pp. 62, 63.

† *V. fuscatum* is referred in *Index Kewensis* to *V. corymbosum* L.: it is interesting to note that Solander in his MS. queries the identity of his plant with the Linnean species.

‡ *Bot. Commentaries*, p. cxxvi.

§ See *ante*, p. 3.

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